Waterbury Office Complex Feasibility Study

PLANET - PEOPLE - PROSPERITY

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Executive Summary

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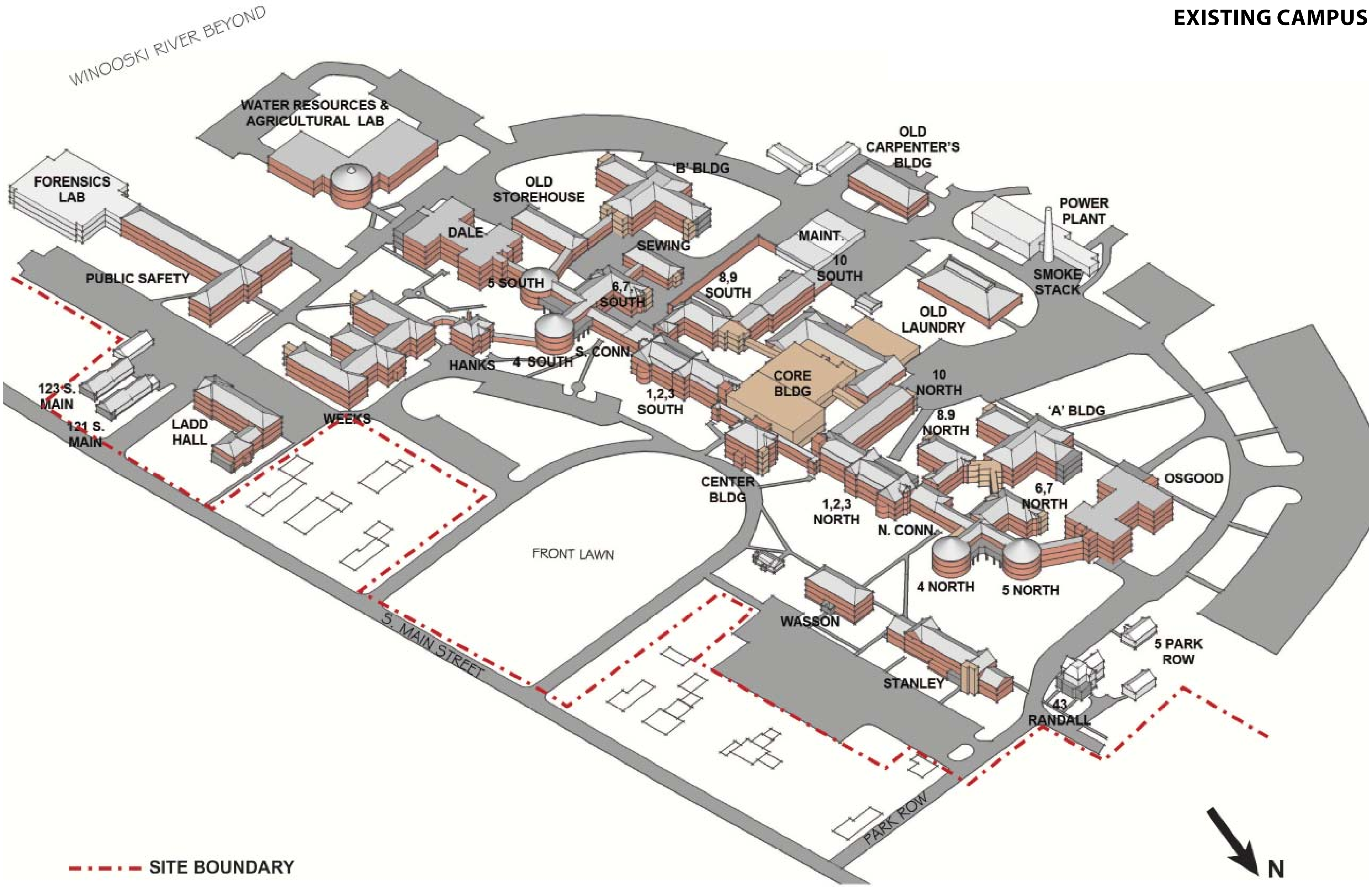


Introduction

WATERBURY OFFICE COMPLEX FEASIBILITY STUDY

The State of Vermont Office of Purchasing & Contracting, on behalf of the Secretary of Administration, engaged the Burlington architectural firm, Freeman French Freeman Architects (FFF) in January 2012 to assess and evaluate long-term options for housing state employees displaced by Tropical Storm Irene. This report compares four options for permanently relocating the displaced employees:

- Option A: Return and full re-use of the Waterbury Complex by the state
- Option B: Multi-use of the Waterbury Complex between the state and other users/partners
- Option C1: New building at the site of the Department of Labor in Montpelier
- Option C2: New building at a previously undeveloped site

FFF collaborated with the Boston design firm of Goody Clancy and seven consultants who collectively evaluated the conditions of the Waterbury Complex and the costs of the four options. The work product is organized in two volumes:

- *Volume 1* includes the Executive Summary (chapter 1), with a brief summary of each consultant report, an overview of the four options, and comparison charts. Detailed discussions of each option follow in chapters 2–6.

3. *Volume 2* incorporates the full background reports from each consultant that underpin the option descriptions (chapters 7–17).

As directed by the State, the team makes no recommendation in this report but attempts to present complex information in a manner that will facilitate comparisons and decisions. The cost estimating and variables are equalized so that each option can be benchmarked against the others with comparable cost information.

The next step is for others to evaluate the decision making variables and weight of each decision making criteria to arrive at the best possible solution for Vermont. We look forward to further engagement in this endeavor.

Project team

- Freeman French Freeman—*architects*
- Goody Clancy—*architects and architectural historian*
- Engineering Ventures, Inc.—*civil and structural engineers*
- Kennedy Advisors, *market analysis*
- Rist-Frost Schumway, *energy specialists, MEP, and power plant*
- Rolfe Jensen & Assoc., *code consultants*
- SE Group, *landscape planners*
- Vanasse Hangen Brustlin, Inc., *floodway/civil engineers*
- Vermeulens, *cost consultants*

USE OF LOCAL VERMONT MATERIALS

Use of the rich palette of Vermont materials will provide durable, elegant finishes in all four of the options presented in this report. These materials might include, but are by no means limited to: Woodbury gray granite; Bethel white granite; Barre granite; Champlain black marble; Danby white marble; Vermont verde antique green marble; Vermont slates; Vermont field stone; and native hardwoods, wood flooring and timbers.

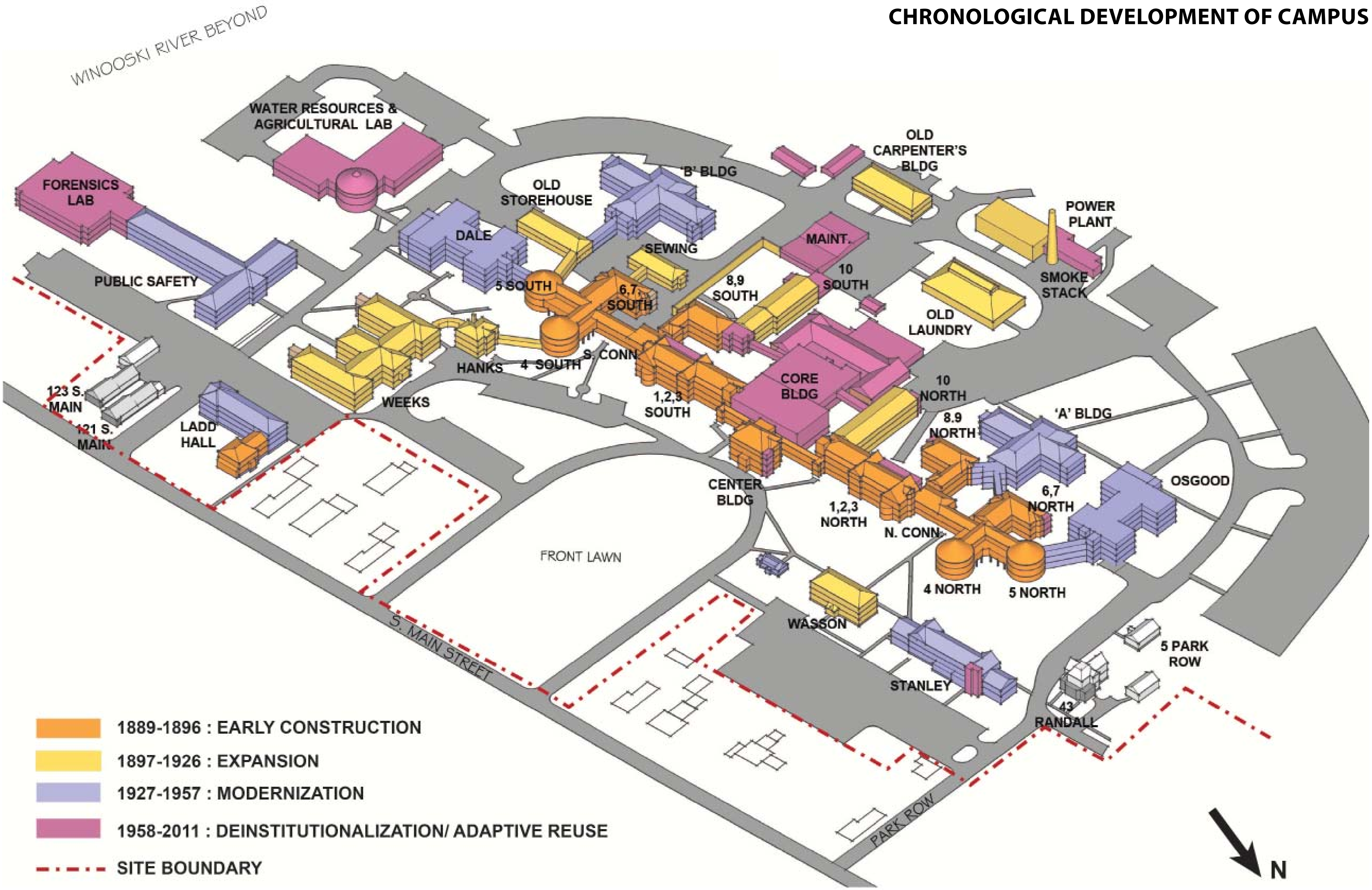
Option A: Full Return and Reuse page 15

Option B: Partial Reuse, New Construction page 18

Option C1: New Construction Offsite, Montpelier page 21

Option C2: New Construction Offsite, Undeveloped Parcel page 24

CHRONOLOGICAL DEVELOPMENT OF CAMPUS



HISTORICAL SUMMARY

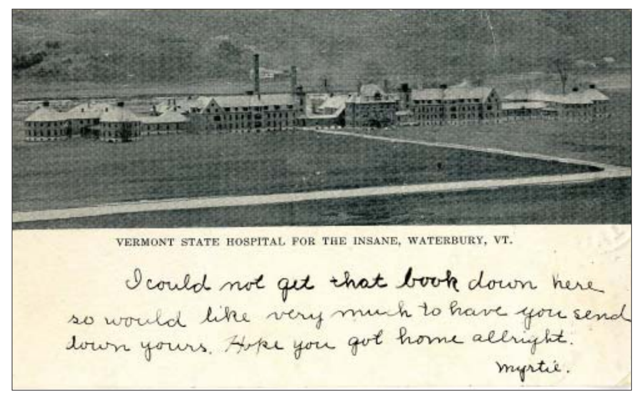
The Architectural History Report for the Waterbury Office Complex—formerly known as the "Vermont State Hospital" and the "Vermont State Asylum for the Insane"—provides a historical framework for assessing reuse scenarios for the site, damaged by flooding from Tropical Storm Irene in 2011. The report includes three main observations:

- The campus developed in four main phases: Early Construction (1889–1896), Expansion (1897–1926), Modernization (1927–1962), and Deinstitutionalization and Adaptive Reuse (1963–2011). The historic campus follows the linear/pavilion model of 19th-century asylum design and dates primarily to the Expansion phase. This period of development played the most significant role in establishing the site's historic character.
- Its listing as a contributing historic property in the Waterbury Village Historic District on the National Register of Historic Places makes the site subject to review by state and federal agencies for proposed changes to historic fabric.
- The complex was designed by Rand & Taylor, a nationally known architecture firm based in Boston whose principals had both been born in Vermont. Their projects include Worcester State Hospital in Worcester, Massachusetts; Mary Hitchcock Memorial Hospital in Hanover, New Hampshire; and Watts Hospital in Durham, North Caroline. The Waterbury State Office Complex represents the firm's largest and most intact extant work.

Based on the Secretary of the Interior's Standards for Historic Properties, the treatment option "Rehabilitation" is recommended for this site. Rehabilitation emphasizes the retention and repair of character-defining extant historic materials, but it offers more latitude for replacing material, reconfiguring the building or site, and introducing adaptations or additions that accommodate or continue modern uses.

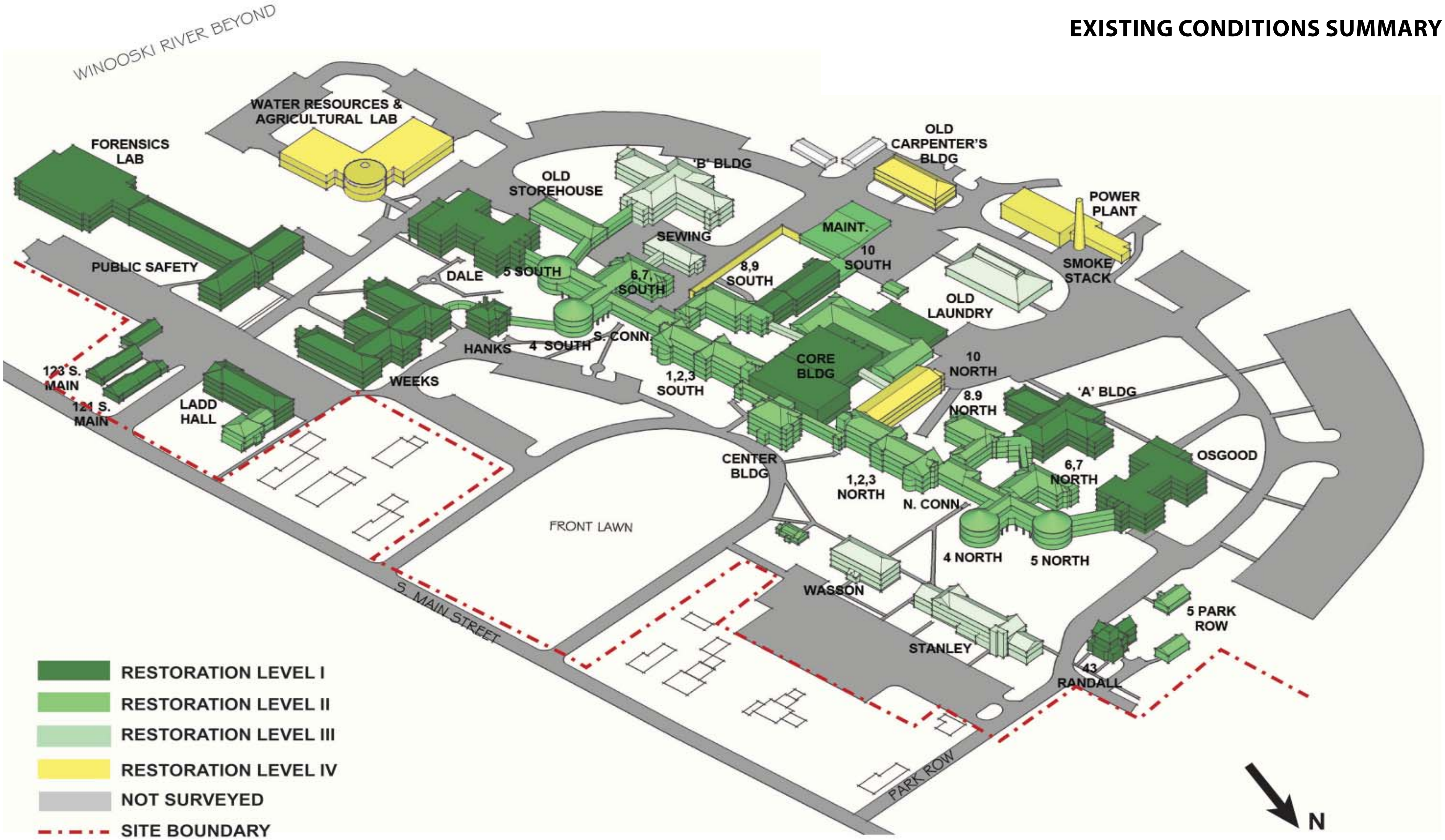
The report provides overall guidelines and a basic historical context for the site. Decisions about individual building treatments will be determined upon review by state and federal government agencies.

Rand & Taylor specialized in large, complex hospital design, as at Worcester State Hospital in Massachusetts.



Two views show Vermont State Hospital at the turn of the 19th century.

EXISTING CONDITIONS SUMMARY



* LEVEL I INDICATES LEAST DEGREE OF WORK REQUIRED TO RESTORE A BUILDING, WHILE LEVEL IV INDICATES HIGEST DEGREE OF REPAIRS AND RESTORATION

EXISTING CONDITIONS SUMMARY

The Existing Architectural Conditions Report presents a preliminary overview of the condition of buildings in the complex. The analysis divides the buildings into four groups based on the estimated level of work needed to restore them to continued use as part of the office campus, as shown in the Existing Conditions Summary map on the facing page.

- **Level I** buildings are in the best condition and require the least amount of repair and restoration work. Common needs include window replacement, repointing and minor rebuilding or replacement of walls and roofs. This group includes recently built structures, like the Forensics Lab and Auditorium, or recently renovated historic buildings, like Weeks and 10 South.
- **Level II** buildings include most of the central, interconnected historic core. Dating mostly from 1896, these buildings will require the same kinds of work as Level I structures but with more substantial rebuilding, replacement and stabilization.
- **Level III** comprises structures like Stanley, Wasson and Sewing, Old Laundry, and 'B' Building that require even greater stabilization and repair to lengthen their usable service life, owing either to construction type (brick veneer), a history of problems, and/or flooding from Irene.
- **Level IV** buildings include the Power House, Old Carpenters Building and 10 North that display noticeable structural deficiencies and require the most extensive repair.

Most campus buildings are in good to fair condition and fall within Levels I and II, thanks to continual use of the campus and constant maintenance and upkeep.

Restoration Level I requires minimal restoration.

Restoration Level II

Restoration Level III

Restoration Level IV requires the most remedial effort.

FLOODWAYS SUMMARY

Two significant flood events have occurred on the Waterbury campus. The most recent, in the wake of Tropical Storm Irene in late August 2011, peaked at 428.5' feet—2.5 feet above the 100-year flood line established by FEMA on the site. The State chose this as the design-to level for both reuse options A and B.

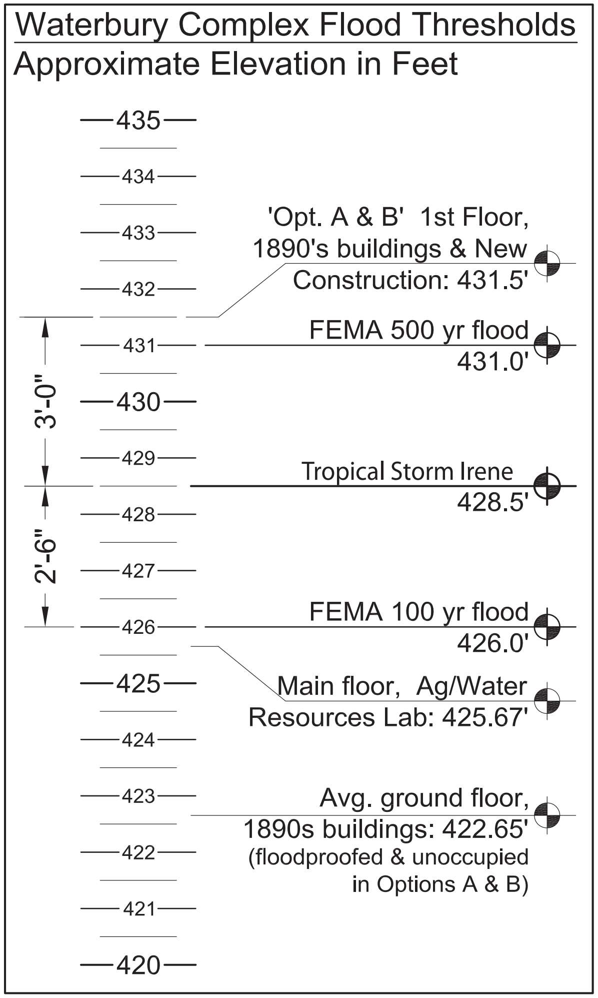
A significant prior flood occurred on November 3, 1927, after two days of torrential rain. The precise peak of that flood went unrecorded, but floodwater filled all basement floors of the campus, whose buildings and grounds suffered extensive damage. It took almost two years to complete all restoration work.

Due to flood control dams installed upstream from the site, it is difficult to draw parallels between Irene and those 1927 floods. It's important to point out that some of these flood controls were nearly maxed out by Irene and improvements to and maintenance of upstream flood controls should be taken into account when considering the Waterbury Site.

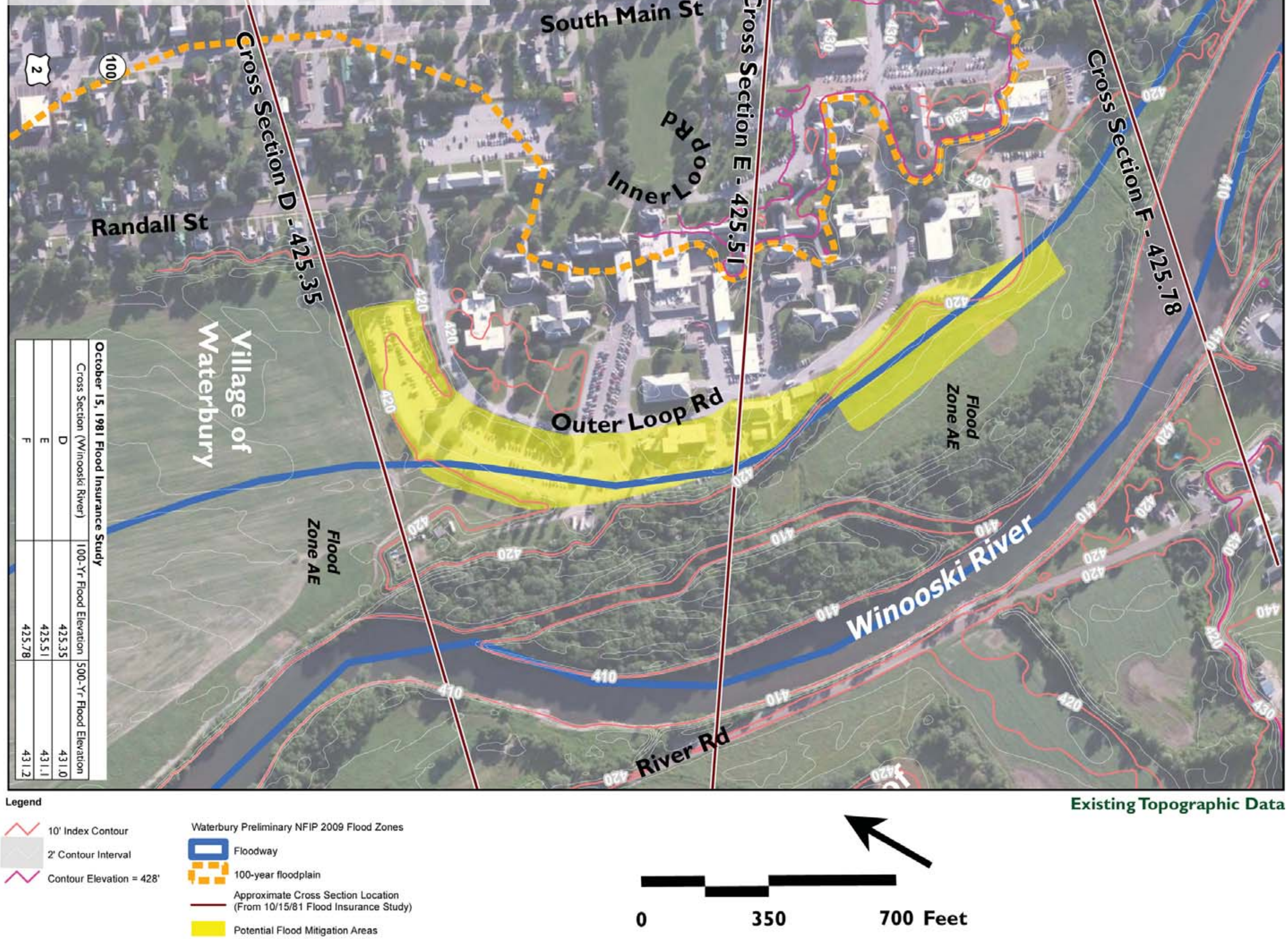
Two of the four options studied involve the Waterbury Complex. Options A (Full Reuse) and B (Multi-use/partial reuse) both require some form of floodproofing and additional mitigation to offset loss of flood storage due to the need to floodproof the retained existing buildings. Beyond floodproofing and mitigation, all options would require seeking permits under numerous state and federal regulations governing floodplain development.

Recommendations for floodproofing elevations reflect historical data compiled from old flood insurance studies as well as the flood heights experienced during Tropical Storm Irene. The preferred method of mitigation—maintaining and possibly increasing existing flood storage—would involve lowering the parking areas at the rear of the site by several feet.

The study team also discussed but did not actively pursue the idea of a levee system to protect the site. The Army Corps of Engineers discourages levees for flood control because several have failed in critical instances around the country in recent years. The State of Vermont's waterways manager and FEMA personnel who participated in project meetings also strongly discouraged their use.



SITE FLOODPLAIN AND FLOOD MITIGATION



October 15, 1981 Flood Insurance Study

Cross Section (Winooski River)	100-Yr Flood Elevation	500-Yr Flood Elevation
D	425.35	431.0
E	425.51	431.1
F	425.78	431.2

SITE INFRASTRUCTURE SUMMARY

Onsite options

Over 220 years, this site has undergone construction, expansions, renovations, and repairs that have left a complex network of transportation and utility infrastructure. Much of this infrastructure has surpassed its expected design life, and Tropical Storm Irene exposed weaknesses in the site's utility systems. The site's current unoccupied condition offers an ideal opportunity to improve critical infrastructure.

- Roadways and parking lots: Existing vehicular areas vary in suitability for re-use. Rebuild these areas where necessary and pave them for ease of cleanup and maintenance.
- Sewer infrastructure: The sewer collection system is very old and very deep. We recommend replacing all trunk lines and structures with modern materials. Renovations of the buildings would allow the introduction of new, higher sewer connections.
- Sewer pump station: This structure's location renders it vulnerable to periodic flooding. Relocate it nearer to the main complex.
- Stormwater system: All drywells on the site are vulnerable to silt from floodwaters and should be replaced with collection-system components. We recommend creation of grass swales and treatment basins to protect downstream water quality and backwater valves at culvert outfalls to limit floodwater entry.
- Tunnels: Numerous pedestrian, steam, and utility tunnels that connect the core buildings are extremely vulnerable to flooding and should no longer be used or maintained. Flowable fill could be used to fill these tunnels.
- Permits: In addition to local approval, an Act250 (land use) permit would be required for reuse of the site. The extent of proposed changes will determine the need for further permits; they could include Stormwater Operational, Stormwater Construction, Wastewater System and Potable Water Supply, Water Supply Construction, Air Pollution Control.

Offsite Options

This study also examined two offsite replacement options. Option C1 would entail a new building on the existing Department of Labor site in Montpelier, a location that would allow easy connection to municipal water and sewer and an existing road network. Like the Waterbury Complex, this site lies within a 100-year floodplain. Since a new building and parking structure are being considered, elevations can be set to avoid damage from a 100-year flood event. That said, construction of a new building would reduce available flood-water storage, an impact that would be nearly impossible to address on site, given the density proposed. This option would require local, Act250 and other state permits.

Option C2 assumes a hypothetical suburban or rural location without significant space constraints. Availability of adequate electrical power and telecom/data service would play a key role in site selection. A requirement for on-site wastewater disposal alone would dictate a parcel of at least 4 acres. The large building and surface parking lot would require stormwater treatment and peak-flow mitigation estimated to require over 30,000 SF. This option introduces the most permitting hurdles and would be the most vulnerable to appeals. A requirement for on-site water and sewer handling would trigger the need for an indirect discharge permit and water system operator in addition to local, Act250, stormwater, water supply construction, and other permits.

STRUCTURAL SYSTEMS SUMMARY

The Waterbury Complex includes approximately 50 buildings built during different periods with different materials. With a few exceptions, they have been well maintained and are in good structural condition. Flooding from Tropical Storm Irene does not appear to have caused significant structural damage: Floodwaters entered the buildings through tunnels and existing wall openings, and exited in the same manner. A diagram of floodwater elevations appears on page 1-8.

Assessment of the existing structures' suitability for the proposed reuse evaluated several concerns, summarized below, including options for mitigating future damage or loss under flood conditions.

Modification of existing structural systems

Most of the existing wood-framed gable roofs will likely require reinforcing to meet current snow-loading requirements under the Building Code. Mechanical equipment relocated to attic spaces will require new support framing above the existing attic floor framing. The wood-framed floors of the original 1890s buildings may require reinforcing to meet future live-load occupancy requirements.

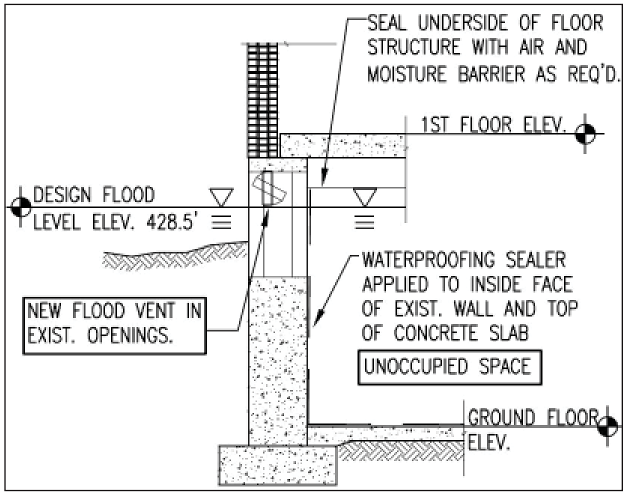
Coordination of new and existing foundations

For existing buildings whose first-floor elevations sit below the DFE, an exterior floodwall could offer an affordable and feasible dry floodproofing option.

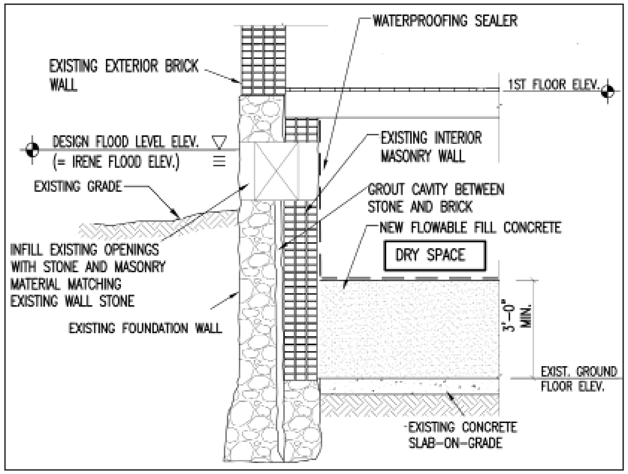
Floodproofing

- As a guide for design requirements of buildings in flood hazard areas, the American Society of Civil Engineers (ASCE) Report 24-05 "Flood Resistant Design and Construction" standard requires siting the lowest occupied floor of a building above the defined design flood elevation (DFE), which is 428.5 feet at the Waterbury Complex site, unless the lowest occupied floor meets the standard's dry floodproofing requirements. Enclosed and unoccupied floors are allowed below the DFE and can be designed in accordance with wet floodproofing requirements. Wet floodproofing design measures outside of this standard and the Building Code will likely not meet loss-prevention measures.
- "**Dry floodproofing**" the ground (lowest) floors of the existing buildings involves designing them to be substantially impermeable to floodwater—that is, to maintain a dry interior.
- "**Wet floodproofing**", in accordance with the ASCE standard, allows floodwaters to enter and reach the DFE in unoccupied ground floor interior spaces through designed openings in the exterior walls.
- The first-floor elevations for most buildings on the Waterbury site sit above the DFE, allowing for either dryproofing or wetproofing floors below them.
- Options considered for dry floodproofing the ground levels of the existing buildings include: building permanent exterior floodwalls or berms around building perimeters; filling ground floors with fill concrete and sealing existing openings below the DFE; and reinforcing existing foundation walls and ground-floor slab with new interior concrete walls and slabs and sealing existing openings below the DFE.
- The "Multi-Use" Option B includes plans for a centrally-located new building. The foundation depth for this building should match the depths of existing foundations or piles to avoid overburdening those foundations with increased soil pressures.

OPTION 1: WET FLOODPROOFING



OPTION 2: DRY FLOODPROOFING



MECHANICAL SUMMARY

The study developed six strategies for mechanical systems at the Waterbury Complex. For comparison purposes, all strategies were initially sized to supply 600,000 gsf of building. The strategies included conceptual-level building footprints and cost estimates; estimates of the complex's future energy needs for the development of energy-use profiles; and detailed system modeling to develop financial analysis, including life-cycle costing and comparison of operating cost and emissions analyses. These options were compared to a base system consisting of an $8.5 million oil-/gas-fired hot-water plant with electric chiller cooling.

- Strategy 1, $17.5 million: Biomass with oil back-up hot-water boilers and electric chillers for cooling
- Strategy 2, $18.5 million: Biomass with oil back-up steam boilers with steam-absorption chillers for cooling
- Strategy 3, $19.0 million: Combined heating, cooling, and electric power via biomass boiler
- Strategy 4, $14.5 million: Hybrid geothermal field with heat pumps w/oil boilers for peak and backup
- Strategy 5, $20.0 million: Hybrid geothermal field with heat pumps w/biomass boilers for peak and backup
- Strategy 6, $24.0 million: Option #5 plus steam/electric turbine for peak/backup plus electric power

Rated by **life-cycle cost (LCC)** from lowest to highest, the top three strategies ranked this way (*note: base system LCC was $38,187,500; LCC figures assume use of #2 fuel oil at a cost of $3.40/gal.*)

- Strategy 1: LCC $18,083,080
- Strategy 3: LCC $18,576,620
- Stratetgy 2: LCC $19,937,400

RFS recommends Strategy 3, with combined heating, cooling and electric power generation from a biomass energy plant with oil-fired backup boilers, steam-driven cooling, and steam/electric turbine for electric power generation. In addition, Strategy 3 converts exhaust steam and peak steam at the plant to hot water for distribution to campus buildings. This option utilizes local fuel (biomass woodchips) for both heating and cooling and uses the resulting steam to generate electricity prior to turning it into hot and chilled water for the complex. The complex's heating and cooling load will determine the amount of electrical power produced, but the analysis estimates electrical generation could supply more than 8% of the complex's needs.

For the two design options for the Waterbury Complex (A and B), discussed in Chapter 2, the cost reflected the actual plant size required to support the facilities shown in those options. The study did not include design of a plant for the offsite options (C1, C2) but rather reviewed the data used for pricing the MEP infrastructure for those sites.

ELECTRICAL SUMMARY

Photovoltaic Power

Photovoltaic systems produce electricity directly from sunlight, providing clean, reliable energy without consuming fossil fuels. This represents a proven power-production mode, and the United States has over 3,100 MW of grid-connected photovoltaic systems installed, roughly 15% of which (449 MW) went into service in the third quarter of 2011.

Several factors determine the size of photovoltaic systems, including:

- Budget
- Available space
- Percentage of energy to be produced
- Availability of tax credits
- Financing
- Net-metering rules
- Utility regulations

The study evaluated a photovoltaic system with a capacity of 290 kW that covers approximately 55,000 square foot of space. Costs for the array would reach a projected break-even point in the 17th year of operation, but the system would not likely produce any net metering revenue. Green Mountain Power offers net metering and an incentive program for photovoltaic power production. This scenario was developed with the Waterbury site in mind but it is applicable to all design options; it is included in the overall project cost for each option.

Site Electrical Distribution and Power Loads

The relocation of the power plant will include relocation and reconstruction of the current 4.16kV electrical distribution system to each building and to the new power plant. Selecting a fully electric chiller for the new central heating and chiller plant would increase electric load. Selection of a steam-absorption chiller, however, would not increase electrical load and would eliminate the summer peak electric load for cooling.

All four options incorporate roughly 290kW of photovoltaic generating capacity. These could be roof-mounted on a parking garage or other structure (lower photo) or arranged in ground-set arrays (upper photo).

BUILDING CODE SUMMARY

The Waterbury Complex comprises approximately fifty buildings across the campus of various ages and construction types. Significant renovation—including additions, changes in use, and reconstruction of older structures—would raise the following issues:

- Construction type. Most of the buildings have brick exterior walls, so construction type would depend on their framing, interior, and structural supports. Building with combustible framing and supports would default to Type IIIB, whereas noncombustible interior elements would allow the buildings to be considered Type I or II. An in-depth study of the construction type of the buildings should be completed as the project scope is further defined.
- Historic-building regulation. A majority of the buildings are considered historical structures and must comply with NFPA 101 Section 43.10, which requires production of a written report documenting preservation issues, building safety features, and demonstrating equivalent levels of code compliance.
- Definition of individual building limits. Creating an addition requires a building to undergo a height and area analysis to ensure that it falls within the maximum allowable limits based on construction and occupancy type. Building separations are critical to compartmentalizing the existing complex into separate buildings to meet the size limitations of the International Building Code.
- Life safety. Reconstruction would require a detailed analysis of means of egress and compliance with Chapter 39 (covering existing businessed) of the Life Safety Code. Changing the use group of a building (such as shifting from *business* to *residential*, classified as the same hazard category per NFPA 101, Table 43.7.3), would require a building to comply with the existing-occupancy chapter of NFPA 101 the new use group (i.e., *residential*). Additionally, sprinkler or detection/alarm systems would need to meet the requirements for new construction for the new use group.

MARKET ANALYSIS SUMMARY

As the Vermont and national economies emerge from a severe recession, interest in private-sector real estate activities has begun to revive in early 2012. The recovery continues at a slow pace, however, and the market for real estate will continue to be limited for the next 12 months. The Waterbury Office Complex does appear, however, to hold some market potential for users other than the State of Vermont:

- Clear potential exists for development of rental housing oriented toward lower- and moderate-income working households. The potential for a development of this type had been documented prior to Tropical Storm Irene, and the storm then exacerbated the problem by destroying a portion of Waterbury's housing stock.
- Commercial real estate investors appear unlikely to seek redevelopment projects at this time. However, some users, such as legal offices and health services offices, might be interested in locating within the complex, particularly if a significant number of state workers return.
- There is clear potential for day-care activities within the complex; an existing operation has expressed interest in returning to the site.

Adaptive reuse has turned the Green Mountain Seminary building in Waterbury Center into 16 units of housing with significantly reduced rents. Available to both family and elderly tenants, four are reserved for households earning less than 50 percent of the county median and the remainder are open to households with incomes below 60 percent of the county median.

Option A
FULL RETURN AND REUSE

Overview

In its current configuration the Waterbury Complex could provide office space for approximately 1,160 workers, a number consistent with occupancy before Tropical Storm Irene. (Although 1,500 state employees were assigned to the site, occupancy was estimated at 1,200.) Fully renovating 316,694 square feet to meet modern open office standards will increase the functionality of the buildings. We recommend selling 48,037 square feet of peripheral buildings for potential redevelopment and demolishing another 92,821 square feet of buildings in very poor condition and/or with ground-floor levels below 428.5 feet, the final flood level on the site caused by Tropical Storm Irene.

The campus's buildings vary in size and height and rely for connections on enclosed walkways, often on the ground floor. As noted, many of those floors will no longer be usable. (Refer to the Occupancy Plan.) The campus configuration under this option supports small clusters of state employees, with only limited and often circuitous passages from one group to another. Programmatically this creates challenges in flexibility of departmental and organizational changes, in shared amenities and in simple proximity and physical access. Care will be required in matching departments and parts of departments to buildings and to floors within buildings while establishing best possible adjacencies.

Advantages

- Re-establishes the status quo and economic value of state workers in Waterbury.
- Creates a maximum number of local jobs with construction dollars (renovation creates 20-40% more jobs than new construction).
- Safeguards cultural heritage by protecting and restoring the historic complex.
- Adds 22,000sf of new building elevated above the 500-year floodplain
- Secures an office complex in a beautiful natural setting with an improved campus landscape.
- Reduces energy use by taking advantage of buildings designed for natural ventilation, views and daylighting to reduce energy demands.
- Modifications may provide additional flood protection to the Town of Waterbury.
- Within walking distance of downtown Waterbury and the scenic area via recreation path.
- Creates refurbished and modern workplaces with healthy, environmentally sustainable strategies.
- Reuses existing buildings and avoids the substantial environmental impact of new construction.
- Offers opportunities for new on-site, low-carbon power generation and installation of substantial solar arrays in the current cornfields.

Disadvantages

- Isolates workers in small groups in individual buildings.
- Does not promote flexibility in workforce reorganization (because of individual buildings).
- The majority of the site is in a 100-year flood plain.
- Flood cleanup in wet-floodproofed existing buildings is more difficult than in new construction.

Construction cost: $115,551,106
Project cost: $142,745,926
Area: 368,700 sq ft (346,700sf renovation, 22,000sf new)
Construction cost per sq ft: $313
Operating cost: 2,770,000
Insurance/FEMA $: $13 - $25 Million + FEMA TBD
Land area/lot size: 44 acres
Permitting process: Low intensity
In floodplain?: Yes
Parking: 800 Cars
Design standard: LEED Gold, Institutional High Quality
Staff capacity: 1,160

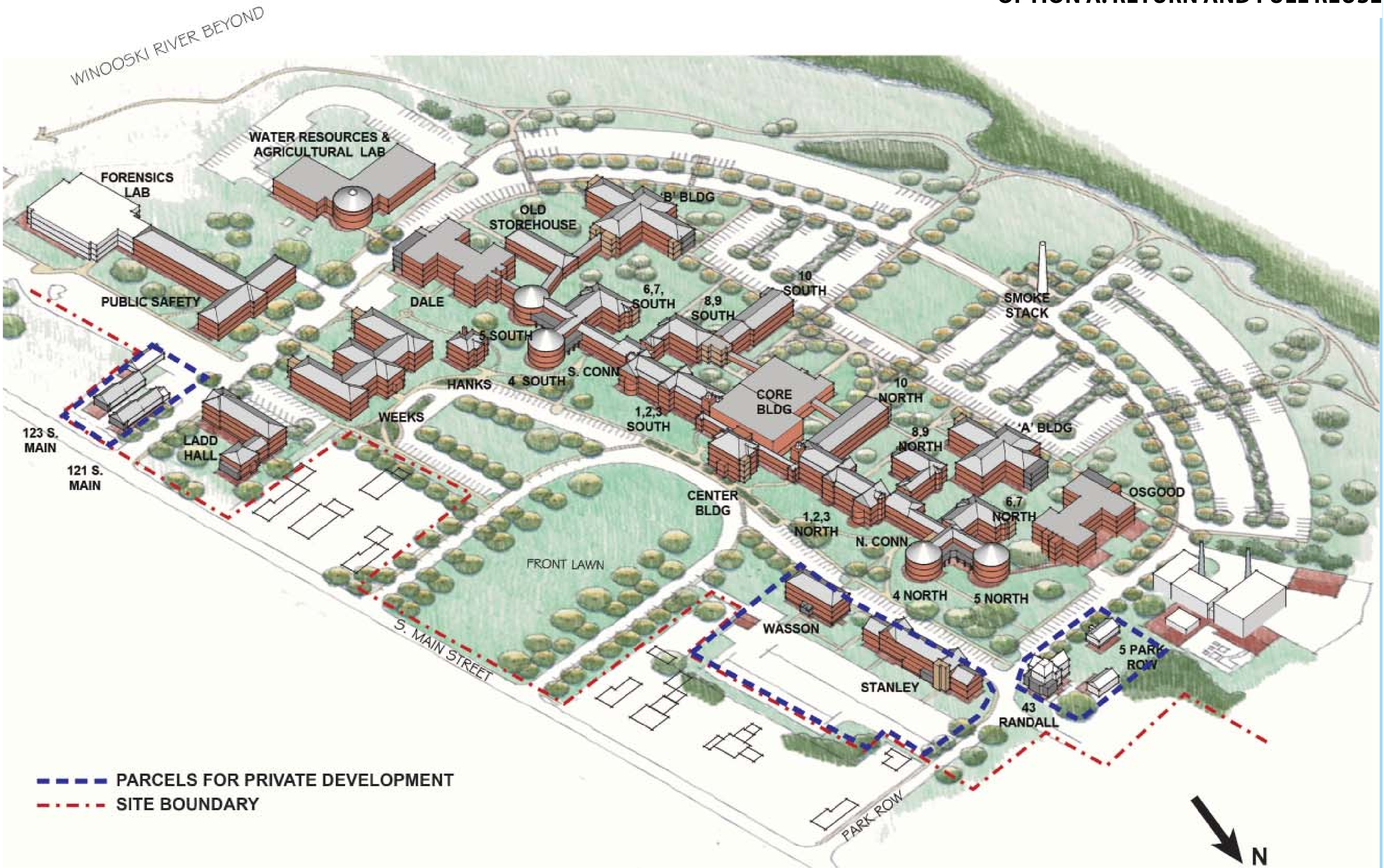
Reducing Costs by Limiting Renovations

This option assumes a significant level of work to restore the Waterbury Complex and create modern workplaces within its remaining structures (Chapters 2–6 describe this work in more detail). The cost of Option A reflects the scope of these renovations, both exterior and interior, some of which addressed deferred-maintenance needs the State had identified in a plan to tackle pre-Irene deficiencies. That plan carried a projected annual cost of $2,000,000 to $3,000,000.

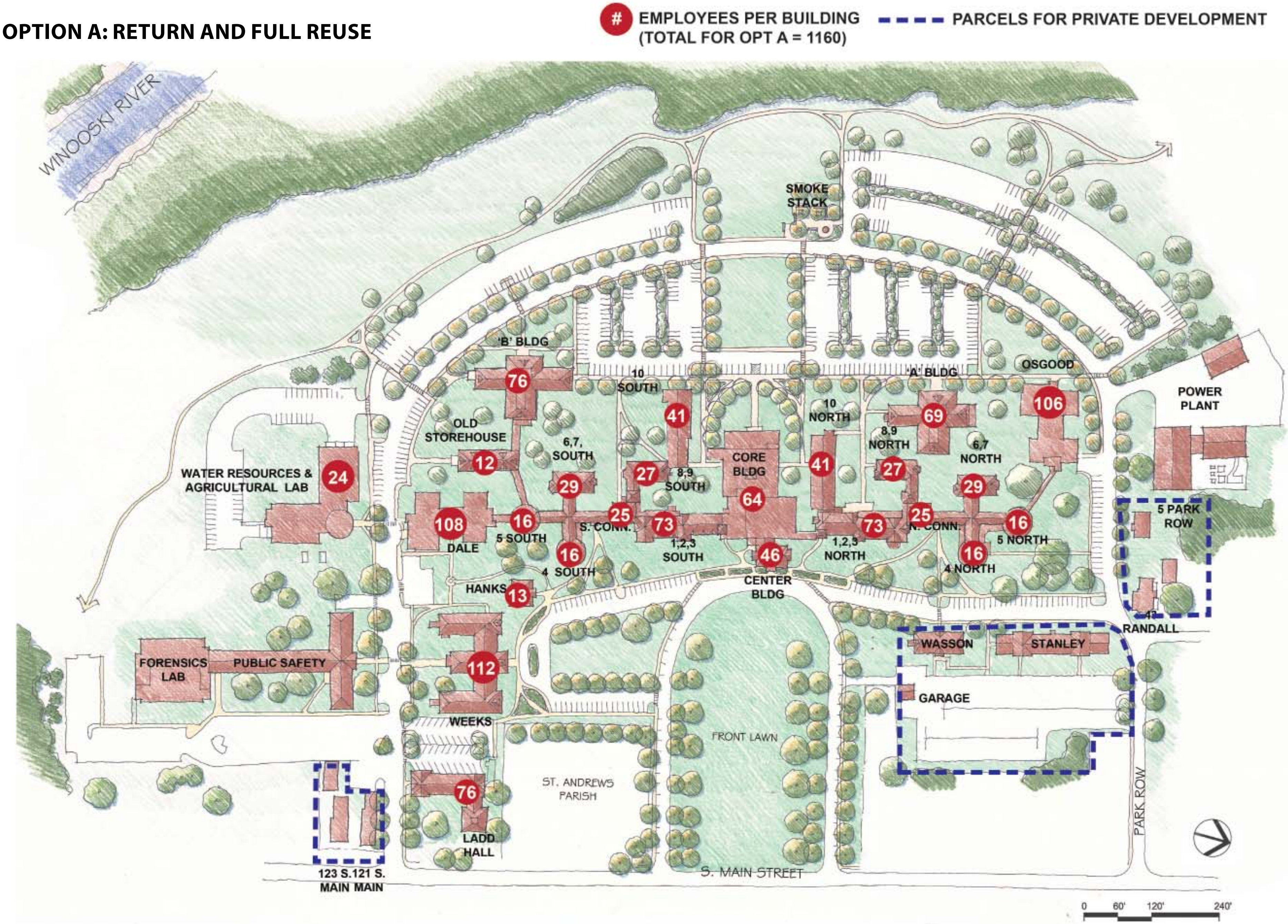
Renovation costs under this option can be reduced by minimizing the interior and exterior upgrades defined in the full cost report. Minimizing renovations would include reducing interior wall demolition to open up spaces; reducing millwork, trim, and finishes; purchasing fewer pieces of new furniture and fewer work stations; choosing basic carpet and paint; replacing fewer windows; reducing the amount of brick pointing and repair; and reducing the area of roofing to be replaced or repaired. Adjusting the quality level of mechanical and electrical systems and cooling required would further lower costs.

Taken together, these reductions could save $9,000,000 in construction costs. They would, however, require an annual increase in operational costs of approximately $500,000 to $1,000,000. Further study and analysis of renovation reductions is warranted to provide a clearer understanding of the cost-to-benefit impacts of such reductions on occupants returning work at the facility.

OPTION A: RETURN AND FULL REUSE



OPTION A: RETURN AND FULL REUSE



Option B

PARTIAL REUSE AND NEW CONSTRUCTION

Option B re-uses the most valuable, historically significant, and useful buildings on the existing campus while adding a major new, state-of-the-art building This old-and-new hybrid will accommodate approximately 1,160 workers, a number consistent with the estimate of occupancy before Tropical Storm Irene. (Although 1,500 state employees had been assigned to Waterbury, actual occupancy was estimated to be 1,200).

- Full renovation of 117,673 square feet to modern open office standards will increase the functionality of the buildings.
- The site's least-significant buildings and those most vulnerable to future flooding, comprising 310,349 square feet, will be removed. These buildings are either in very poor condition and/or have first-floor levels below 428.5 feet, the final flood level on the site in August 2011.
- Sale of several peripheral buildings for potential redevelopment.

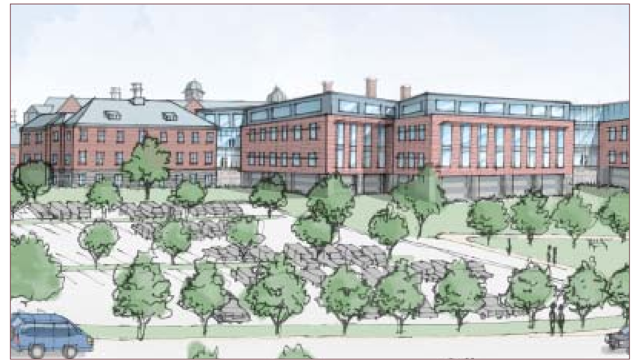
This option balances the preservation and re-use of the historical Waterbury complex with the realities of its location on a flood plain and the real advantages of a new, purpose-built Vermont state office building.

Advantages

- Re-establishes the status quo and economic value of state workers in Waterbury.
- Creates a substantial number of local jobs with it balance of renovation and new construction.
- Safeguards cultural heritage by protecting and restoring the core of the historic Waterbury Psychiatric Hospital.
- Adds XX,XXX of new building elevated above the 500-year floodplain
- Provides an office complex in a beautiful natural setting with an improved campus landscape.
- Allows appropriate and efficient matching of space to departmental and functional needed with a balance of relatively narrow existing buildings and the large open floor plates of the new building.
- May provide additional flood protection to the Town of Waterbury with modification of the site.
- The site lies within walking distance of downtown Waterbury and to the scenic area via recreation path.
- Creates refurbished and modern workplaces with healthy, environmentally sustainable strategies.
- Reuses existing buildings and reduces the substantial environmental impact of all-new construction.
- Offers opportunities for on-site, low-carbon power generation and installation of substantial solar arrays (in the current cornfields)
- Incorporates a wide array of sustainable features in the new building, with an emphasis on Vermont-sourced materials such as granite, slate, and woods.
- Allows flexible and open groupings of workers, which have been shown to improve productivity and worker satisfaction, thanks to large, open floor plates.
-

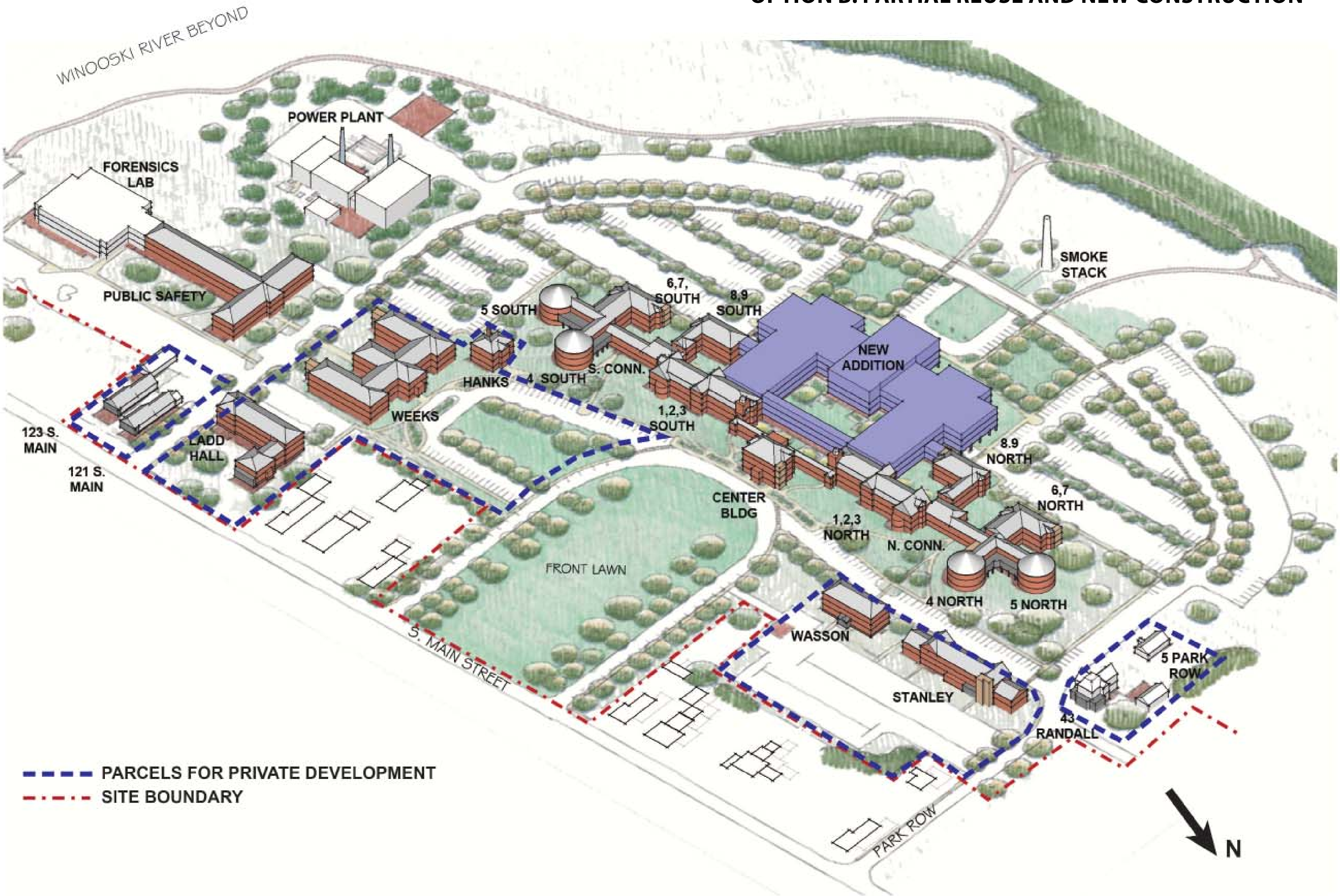
Disadvantages

- Demolishes a substantial number of existing buildings.
- The majority of the site sits in the 100-year flood plain.

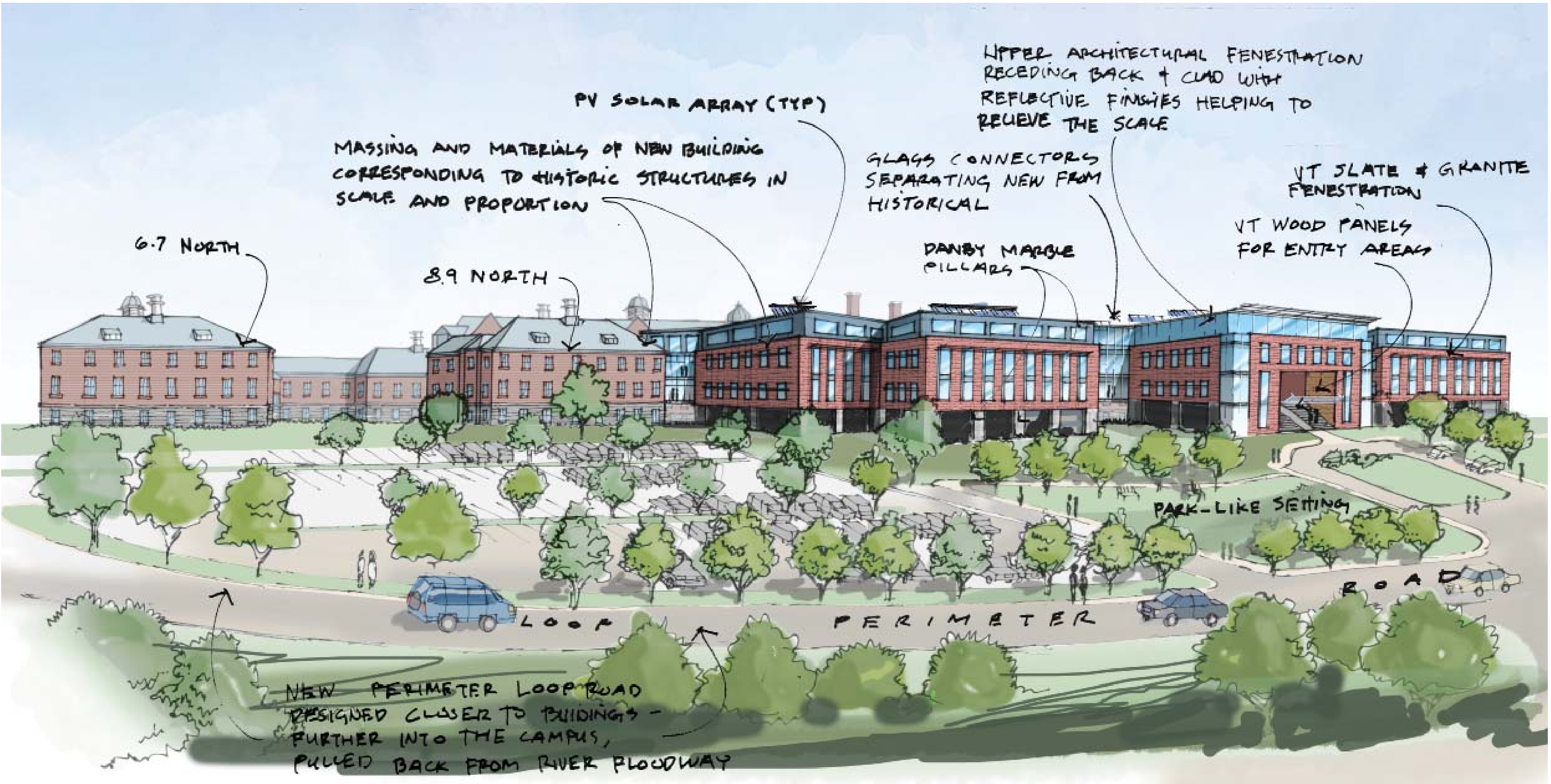


Construction cost: $105,644,978
Project cost: $134,291,281
Area: 253,530 sq ft (117,700sf renovation, 135,830sf new)
Construction cost per sq ft: $417
Operating cost: $2,365,000
Insurance/FEMA $: $13 - $25 Million + FEMA TBD
Land area/lot size: 30 acres
Permitting process: Low- Medium intensity
In floodplain?: Yes, new construction elevated
Parking: 800 cars (140 of these under building)
Design standard: LEED Gold, Institutional High Quality
Staff capacity: 1,024

OPTION B: PARTIAL REUSE AND NEW CONSTRUCTION



OPTION B: PARTIAL REUSE AND NEW CONSTRUCTION


UPPER ARCHITECTURAL FENESTRATION RECEDING BACK & CLAD WITH REFLECTIVE FINISHES HELPING TO RELIEVE THE SCALE
PV SOLAR ARRAY (TYP)
MASSING AND MATERIALS OF NEW BUILDING CORRESPONDING TO HISTORIC STRUCTURES IN SCALE AND PROPORTION
GLASS CONNECTORS SEPARATING NEW FROM HISTORICAL
VT SLATE & GRANITE FENESTRATION
VT WOOD PANELS FOR ENTRY AREAS
DANBY MARBLE PILLARS
6.7 NORTH
8.9 NORTH
PARK-LIKE SETTING
LOOP
PERIMETER
ROAD
NEW PERIMETER LOOP ROAD DESIGNED CLOSER TO BUILDINGS - FURTHER INTO THE CAMPUS, PULLED BACK FROM RIVER FLOODWAY

Option C1

NEW CONSTRUCTION, MONTPELIER SITE

If the State decides against redevelopment of the Waterbury site as described in options A and B, a new building consolidating the Agency of Human Services (AHS) at the site of the existing Department of Labor (DOL) building off Memorial Drive in Montpelier would provide enough additional office space to house workers displaced from Waterbury. This design could house 1,298 workers—the combined total of current AHS staff plus the DOL staff displaced by demolition of the existing building. The site cannot accommodate this quantity of workers if the existing building remains.

Like the Waterbury Complex, the DOL site:

- sits in a floodplain,
- is located adjacent to an existing town center with access to municipal services, and
- has previously been developed.

Advantages

- Consolidates state government agencies and leadership in Montpelier.
- The site sits upstream of the Waterbury complex and there is less of a catchment area to contribute to major flooding. As a result, flood risk is slightly lower.
- Designing and constructing a new building for a site in a floodplain will be more straightforward than retrofitting existing buildings, as in the case of Waterbury.
- The site is well served by transit and is adjacent to other state workers in downtown Montpelier and at the National Life complex. It is also connected to services in downtown Montpelier, which are within walking distance along a recreation path.
- Municipal water and sewer serve the site, and adequate power and telecom/data infrastructure is present.
- Building could tie into new state district heating plant (a stand-alone plant is currently included in the costs).

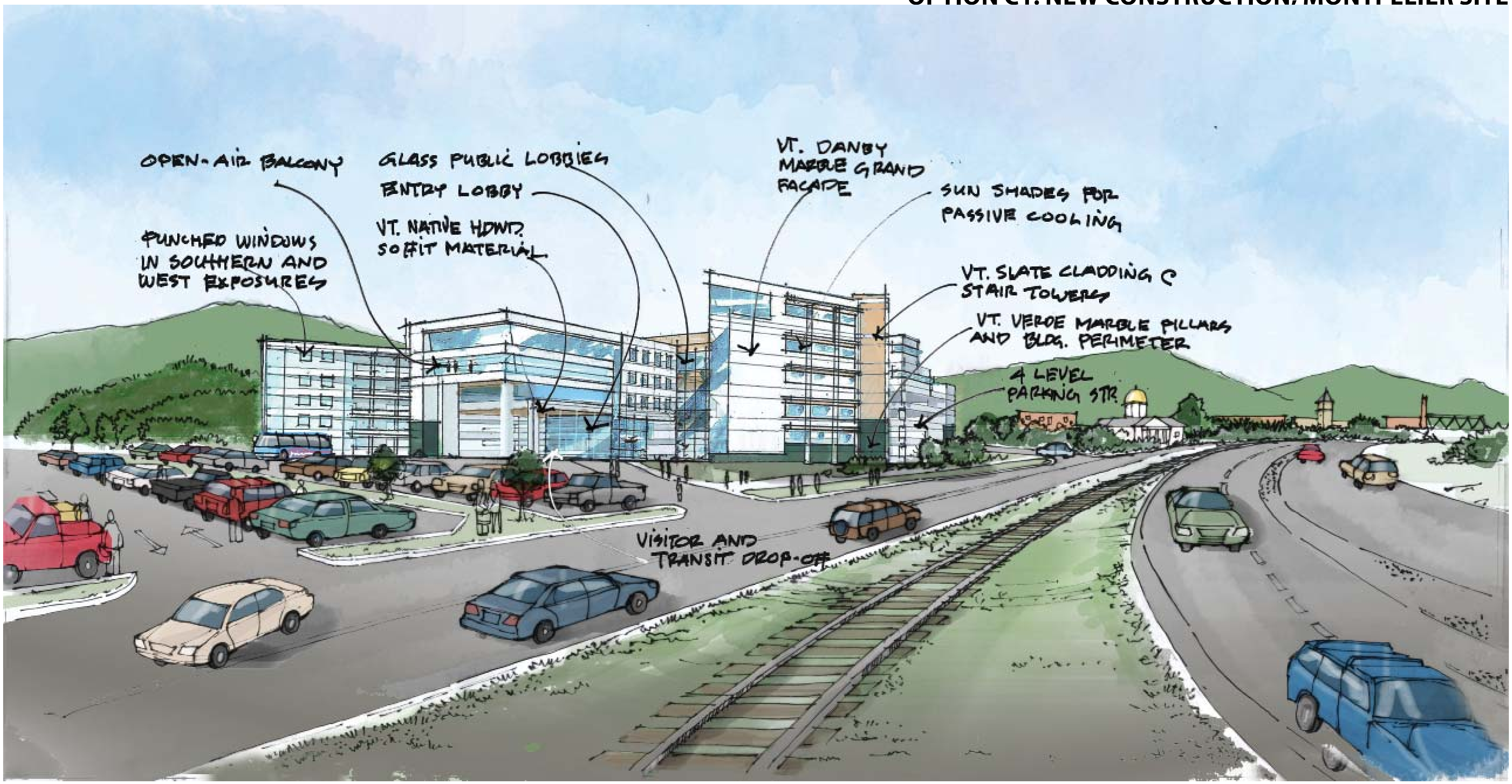
Disadvantages

- The proposed design exceeds what is currently permitted by zoning; the site cannot accommodate the AHS and DOL workers and the required parking while adhering to current zoning regulations. Relief from zoning requirements will be necessary.
- Additional land acquisition will be required; even as designed with a multilevel parking structure, the site cannot accommodate the required parking for workers and visitors, fleet-vehicle storage, and park-and-ride functions currently located on the property.
- Demolition of the existing **DOL** building will be required to accommodate the program on this site. There is potential to salvage the granite cladding as mitigation, as the building has historical classification. 160 **DOL** employees would be displaced during construction, but the design allows them to move back to this site.
- Roadway improvements and traffic signals will be needed.
- A medium-intensity Act 250 permitting process would be required, with possible complications due to construction in the floodplain and known archaeological sensitivity.
- “Mothballing” of the Waterbury site incurs expenses and potential liabilities.
- Parking garage will require a budget for annual maintenance expenses.
- A traffic study will likely indicate an increase in traffic congestion.

Construction cost: $86,866,734
Project cost: $118,693,070
Area: 277,760 sq ft
Construction cost per sq ft: $381
Operating cost: $1,890,000
Insurance/FEMA $: $13 - $25 Million
Land area/lot size: 5.5 acres building site + 1.5 acres parking
Permitting process: Medium to High Intensity
In floodplain?: Yes
Parking: 700 cars (438 in Parking Structure, 262 open site)
Design standard: LEED Gold, Institutional High Quality
Staff capacity: 1,168

OPTION C1: NEW CONSTRUCTION, MONTPELIER SITE

OPTION C1: NEW CONSTRUCTION, MONTPELIER SITE




Winooski River
292 cars -
GMP site
Geo-thermal
wells
Transit
5- story New Facility
Loop
Parking structure green roof
Roof-top
P.V. panels
G.M.
Building
Montpelier High School
running track
North
Green Mountain Drive
R.R. Spur
Memorial Drive
NTL. Life Drive

Option C2

HYPOTHETICAL SITE WITHOUT MUNICIPAL WATER AND SEWER

If the State decides against redevelopment of the Waterbury site, as described in options A and B, a new building to consolidate the Agency of Human Services (AHS) facility on a previously undeveloped site would provide enough office additional office space to house all displaced workers from Waterbury; this option has capacity for 1,138 employees.

We designed this option for an imagined building site that:

- does not sit in a floodplain;
- is not in an existing town or city center, and
- has not been previously developed.

Taken together, these site selection criteria eliminate many of Vermont's city, town, and village centers, which are often located in river valleys due to historical settlement patterns.

A suburban "greenfield" (previously undeveloped) site offers a possible alternative, with its own set of advantages and disadvantages:

Advantages

- A site out of the floodplain can be selected and flood mitigation costs avoided.
- Potentially lower insurance costs.

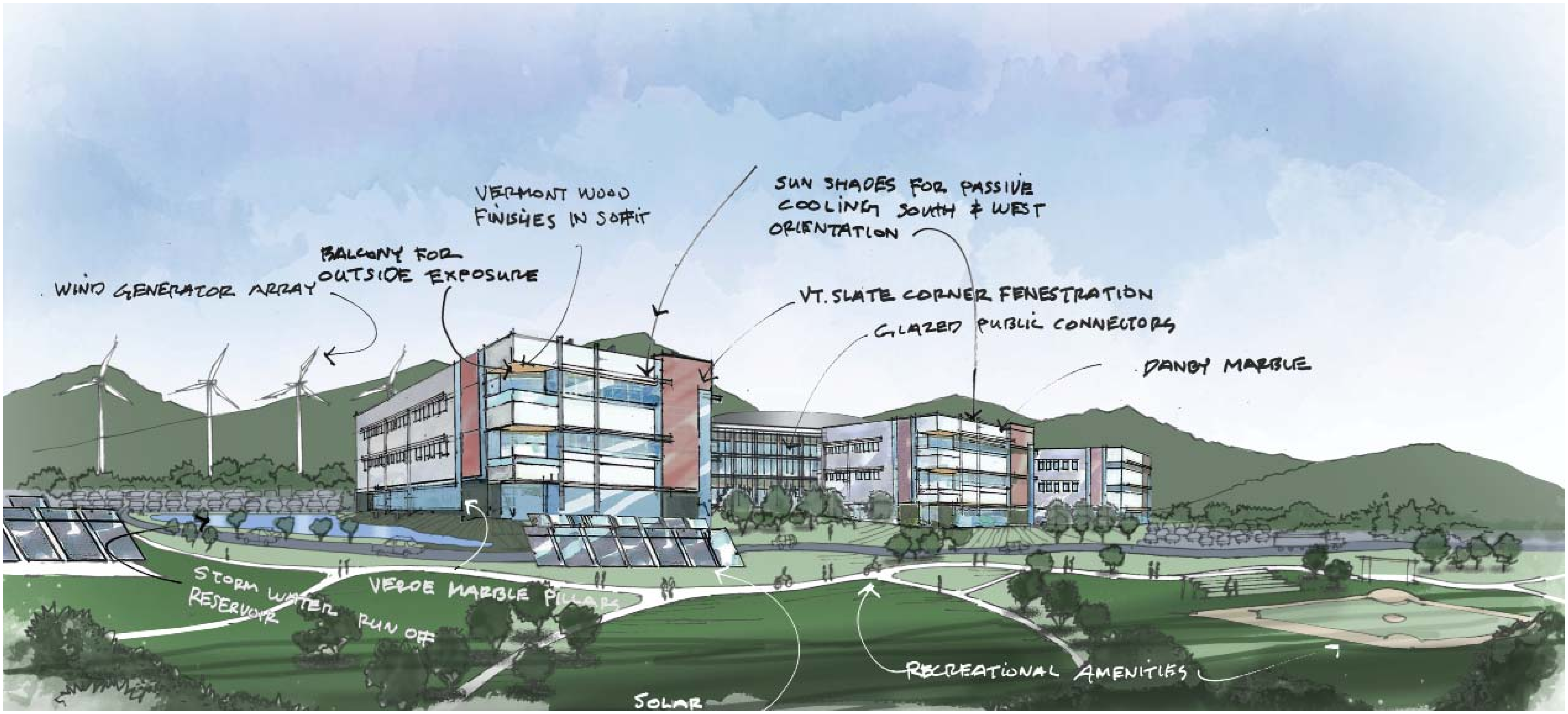
Disadvantages

- Land acquisition would be required because the state does not own a large enough greenfield site in central Vermont.
- Building away from existing town centers increases automobile dependence and requires roadway improvements and traffic signals.
- An extensive Act 250 permitting process will be required.
- The project would likely need to provide its own water and wastewater disposal.
  - > Conventional methods, including wells and septic systems, may not be feasible on many Central Vermont sites.
  - > Rainwater collection, purification, and storage may be viable; a living machine for wastewater processing may also be viable.
  - > Either method will require a licensed operator and create substantial ongoing costs.
  - > Firefighting water storage and pumps would be required.
- Adequate power and data infrastructure may not be present at some possible sites.
- "Mothballing" of Waterbury site incurs expenses and potential liabilities.

Construction cost: $78,574,343
Project cost: $108,043,465
Area, sq ft: 199,680 sq ft
Construction cost per sq ft: $394
Operating cost: $1,805,000
Insurance/ FEMA $: $13 - $15 Million
Land area/ lot size: 30-40 acres*
Permitting process: Medium to High Intensity
In floodplain?: No
Parking: 768 cars, open site
Design standard: LEED Gold, Institutional High Quality
Staff capacity: 1,024

OPTION C2: HYPOTHETICAL SITE WITHOUT MUNICIPAL WATER AND SEWER

OPTION C2: HYPOTHETICAL SITE WITHOUT MUNICIPAL WATER AND SEWER




Signaled Intersection
768 Car Surface Lot
Storm Water & Fire Water Reservoir
3-Story New Facility
Delivery
Septic Field
North

SUMMARY OF CONSTRUCTION AND PROJECT COSTS

The chart below details construction and project costs to allow comparison of the four options. The notes highlight some of the variables within each option that contribute to its costs. These are "order of magnitude" figures, given the level of development in the study's architectural and engineering drawings, variations within each option, and the study's relatively short duration. The calculations that produced these figures appears in the Cost Analysis section, which offers substantially more detail than this summary.

Hard and Soft Costs

Construction costs include the "hard costs" of contractor and subcontractor bids, including all materials and labor required in constructing a building. *Project costs* include all "soft costs" required to complete the project, including but not limited to furnishings, loose equipment, project contingency, architectural and engineering fees, permitting fees, administrative and legal fees, unforeseen conditions like hazardous waste removal, photovoltaic-systems and specialized energy equipment.

Of special note, this summary separates site and building costs for accommodating vehicles from general site costs. Design for vehicular uses involves open surface parking, under-building parking and multiple-level parking structures, depending on the option being reviewed. The cost of flood-mitigation measures is also segregated. It includes floodway improvements and dryproofing or wetproofing of the lower levels of new or existing buildings below the "Irene flood levels" as defined in the engineering reports.

SUMMARY OF CONSTRUCTION COSTS

GSF	DEMOLITION	NEW BUILDING	RENOVATIONS	GENERAL SITE WORK	PARKING	FLOOD MITIGATION	POWER PLANT/ CENTRAL PLANT (14)	TOTAL (14)	COST PER SQ FT
Option A—Return & Full Reuse of Waterbury Complex									
368,694	$6,072,636 (1,2)	$1,050,790	$72,598,609 (15)	$10,275,000	$2,740,000	$5,814,071 (8,9)	$17,000,000 (11,12)	$115,551,106	$313
Option B—Partial Reuse & New Construction									
253,503	$4,745,858 (1,2)	$34,464,489	$24,523,187	$10,275,000	$10,353,005 (5)	$4,783,439 (8,9)	$16,500,000 (11,12)	$105,644,978	$417
Option C1—New Offsite Building, Montpelier									
227,760	$549,754 (3)	$62,492,528	$0	$3,822,300	$10,827,810 (6)	$3,245,749 (10)	5,928,593 (13)	$86,866,734	$381
Option C2—New Offsite Building, Undeveloped									
199,680	$0	$57,126,984	$0	$13,536,635 (4)	$3,807,300 (7)	$0	$4,103,424 (13)	$78,574,343	$394

Notes

1. Demolition for A and B includes both full building demolition and selective demolition inside historical structures for renovations and improvements.
2. Demolition for A and B includes $500,000 for asbestos removal.
3. C1 demolition includes removal/recycle of the existing DOL building.
4. C2 general site work includes the cost of onsite sewer, septic, stormwater treatment, and other independent systems. See Project C2 Narrative (Chapter 5) for $5 million deduct if town water and sewer are provided.
5. Parking cost for B includes 140 car stalls under the new building component.
6. Parking cost for C1 includes a 438-car parking structure integrated into the building and 262 surface stalls.
7. C2 parking includes 768 surface stalls. Creating a parking structure for 550 of those cars (with the balance of spaces remaining as surface parking) would add $9.75 million to the values shown. A garage would also increase operating costs shown on the next page.
8. Flood mitigation for A and B includes a cost to improve the floodway by excavating existing parking areas outside the loop road to reduce existing volume.
9. A and B use dry and wet floodproofing of the lower levels for floodplain mitigation. See the engineering report for details.
10. C1 mitigation cost involves constructing the first floor above 100-year flood levels and wetproofing under the raised structural slab.
11. Power plant cost for A and B (free-standing building of 20,000sf) includes capacity for Public Safety, Forensics Building, and other remaining campus buildings used by the State.
12. Power plant costs do not include capacity for town or private uses, but the plant is designed to be expandable if needed. See the engineering reports for details.
13. Power plant costs in C1 and C2 are solely for the single building designed; the plants are integrated into each structure.
14. Construction costs reflect a 15% design contingency and a 3%-6% construction contingency, depending on the option's complexity. An escalation factor of 6% (1% per quarter) has been applied for construction beginning in the 3rd quarter of 2013.
15. See Project Option A narrative (Chapter 2) for a renovation deduct of $9 million if less renovation scope is selected.

PROJECT COSTS

OPTION	TOTAL CONSTRUCTION COST	PROJECT COST MULTIPLIER (1)	OTHER	TOTAL PROJECT COST
Option A—Return & Full Reuse of Waterbury Complex	$115,551,106	$27,194,820	$0	$142,745,926
Option B—Partial Reuse & New Construction	$105,644,978	$22,646,303	$6,000,000 (2)	$134,291,281
C1—New Offsite Building, Montpelier	$86,866,734	$20,526,336	$11,300,000 (2,3,4,5)	$118,693,070
C2—New Offsite Building, Undeveloped	$78,574,343	$18,369,122	$11,100,000 (2,3,4,5)	$108,043,465

Notes

1. The Project cost multiplier includes furnishings, loose equipment, project contingency, A & E Fees, permit fees, admin & legal fees, solar equipment, and other "soft costs". Calculated using 30% of New Building, Renovations, and Power plant costs.
2. Options B, C1, C2 Have $6M for replacement AG/ANR Laboratory, location T.B.D
3. Options C1, C2 Have $ 3 M for "Mothballing" Waterbury, Selective Demo, and Floodway Improvements.
4. C1 Land Acquisition Estimated at $ 2.8 M. C2 Land Acquisition Estimates at $ 1.8 m.
5. For off Site Roadways and Traffic Controls C1 includes $500K and C2 includes $ 300K.

ANNUAL OPERATING COSTS

Projected annual operating costs for the four design options appear below. They provide a basis for comparison among the options and represent estimates of the major expenses, not an exhaustive list of detailed costs.

Using an energy model based on anticipated building design and power plant engineering, the study developed utility costs for each option. These costs cover building electricity, heating and cooling, and other utility costs. The maintenance cost reflects the personnel needed to maintain each building, all the materials required to operate it, and typical repairs. Maintenance costs do not include deferred maintenance, since these are new or newly renovated structures.

The Waterbury Complex operating costs were analyzed to better understand the costs involved with the State Office Complex. For comparison, an adjusted annual budgeted expense for Waterbury was $5,449,000. To utilities and maintenance the study adds PILOT expenses (Payment in Lieu of Taxes) and property and casualty insurance. BGS provided the PILOT figure, which comes under a statewide program. The figure for property and casualty insurance reflects the construction value of the new buildings and replacement value of the renovated buildings.

ANNUAL OPERATING COSTS

OPTION	UTILITY COST	MAINTENANCE	TAXES/P.I.L.O.T.	INSURANCE	TOTAL OPERATING COST
Option A—Return & Full Reuse of Waterbury Complex	$900,000	$1,600,000	$200,000	$70,000	$2,770,000
Option B—Partial Reuse & New Construction	$800,000	$1,200,000	$300,000	$65,000	$2,365,000
C1—New Offsite Building, Montpelier	$500,000	$900,000	$430,000	$60,000	$1,890,000
C2—New Offsite Building, Undeveloped	$500,000	$1,000,000	$250,000	$55,000	$1,805,000

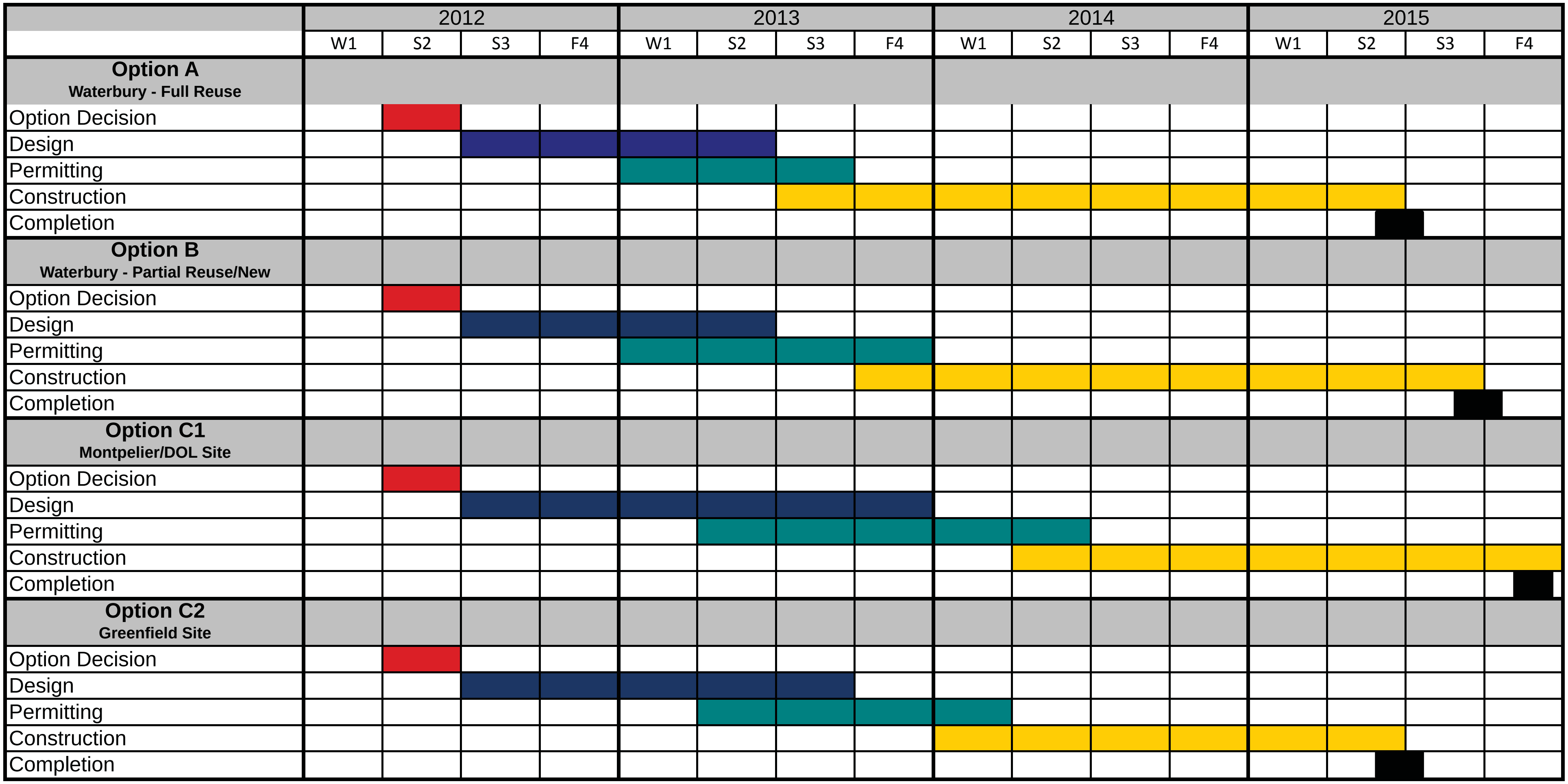
DESIGN & CONSTRUCTION SCHEDULE COMPARISON

The comparison chart shows each of the four options and their design, permitting, and construction schedules in general terms. The time measurement across the top of the chart is in seasons (winter, spring, summer, and fall) and yearly quarters (1, 2, 3,and 4) representing three month increments. With feasibility studies and conceptual design this comparison schedule shows relative changes in timeline due to option nuances. All four projects take roughly the same amount of time, three months plus or minus of each other totaling a six month differential from shortest to longest. This conceptual schedule is based on an aggressive approach to achieving project milestones, approvals, and flow of information without any major unforeseen obstacles creating project detours.

Notes

1. The schedules start with a decision and directive period for selecting an option in the spring quarter 2012.
2. The design duration depends on owner's and occupant's timely decisions on space requirements, building preferences, and systems/products incorporated. The design timeline assumes a flow of design phases with no major stops or pauses.
3. Permitting includes Act 250, planning and zoning, historic review, and construction permits. Due to many review factors, variables, and public participation, this timeline is the least predictable of the four options. State historic review will help determine federal historic review, but the outcome will involve a process of negotiation.
4. Construction is assumed to be a single, uninterrupted phase. Unforeseen conditions, site/archeology unknowns, and weather can lengthen a construction timeline.
5. The construction timeline assumes working with a construction manager during the design and bidding process to take advantage of early bid packages and quality-control procedures.

DESIGN & CONSTRUCTION SCHEDULE COMPARISON



COMPARING THE OPTIONS

This chart includes key facts to facilitate comparison of the four options. Supporting information for each heading appears in the executive summary and full report. The figures in the final column represent an estimated range of possible insurance proceeds and FEMA funding that would reduce the total project cost for each option. These numbers cover a wide potential range and are the subject of current negotiations.

Notes

1. The capacity figure that appears after each option title can be studied in detail in the programming report. The C1 capacity figure includes Department of Labor occupants.
2. Construction and project cost definitions appear in the Cost Summary Chart.
3. Project cost per square feet incorporates building costs, site costs, flood mitigation, parking, power plant, and "soft costs" to arrive at a total project cost.
4. Insurance proceeds and FEMA funding could fall within a wide range of values and possibilities, which are currently under negotiation.

COMPARING THE OPTIONS SUMMARY CHART (1)

CONSTRUCTION COST	AREA IN SQUARE FEET	CONST. COST/SF (3)	PROJECT COST	FLOOD PLAIN MIT.	PERMITTING PROCESS	PARKING (# OF CARS ACCOMMODATED)	ANNUAL OPERATING COST	DESIGN STANDARD	LAND REQUIRED	INSURANCE PROCEEDS FEMA FUNDS (5)
Option A: Return & Full Reuse of Waterbury Complex/1,160 occupants										
$115,551,106	• Reno: 346,700 • New: 22,000 • Total: 368,700	$313	$142,745,926	Yes	Low intensity	• Open site: 800	$2,770,000	LEED Gold Institutional High Quality	Existing reduced ±44 acres	Ins.—$13- $25 million FEMA—TBD
Option B: Partial Reuse & New Construction/1,024 occupants										
$105,644,978	• Reno: 117,700 • New: 135,830 • Total: 253,530	$417	$134,291,281	Yes	Low to medium intensity	• Open site: 660 • Under bldg: 140 • Total: 800	$2,365,000	LEED Gold Institutional High Quality	Existing reduced ±30 acres	Ins.—$13- $25 million FEMA—TBD
Option C1: New Offsite Building, Montpelier/1,168 occupants (1,4)										
$86,866,734	• New: 227,760 • Garage: 177,000 • Total: 227,760	$381	$118,693,070	Yes	Medium to high intensity	• Open site: 262 Structured: 438 • Total: 700	$1,890,000	LEED Gold Institutional High Quality	Building: 5.5 acres Parking: 1.5 acres	Ins.—$13- $25 million FEMA—$0
Option C2: New Offsite Building, Undeveloped/1,024 occupants (4)										
$78,574,343	• New: 199,680 • Total: 199,680	$394	$108,043,465	No	Medium to high intensity	• Open site: 768 or • Possible structured	$1,805,000	LEED Gold Institutional High Quality	30 - 40 acres	Ins.—$13- $25 million FEMA—$0

PROGRAMMING

Freeman French Freeman met with several State agencies in an effort to develop a clear picture of the space requirements the four options would need to meet. Many of the agencies interviewed were located in the Waterbury Complex prior to Tropical Storm Irene, but discussions with additional agencies provided a deeper understanding of optimum office-space use. The interviews focused on space needs, ideas for collaboration, and possible efficiencies from "telecommuting." The agencies interviewed were ANR, AOT, ACCD, AHS and DOE ; programming sheets and charts appear in the full report along with definitions for acronyms.

All agency and department leaders expressed strong interest in promoting collaboration within departments and between agencies for more effective problem solving. Tropical Storm Irene forced relocations that exposed Waterbury employees to more efficient and effective work environments with fewer private offices, current work station technology, collaborative zones, and more interaction among employees.

One goal of the study was to determine how many net square feet (NSF) of workspace—inclusive of work stations, internal circulation, and conference rooms—each employee would need. Based on current standards and an analysis of recently built private-sector workplaces, the study adopted 150 NSF as the standard for establishing space needs. Applying "net to gross" industry design standards determined the gross square footage (GSF) required for designing a new building or redeveloping historical structures like the Waterbury Complex. The GSF factor for new construction (30% of net) and renovation (45% of net) takes into consideration all building shell and core elements to support the NSF total for work areas.

We asked all agencies if telecommuting or telework was being utilized. Most have approved telework on a limited basis—up to one day per week—with a small number of employees choosing this option. Other ideas, including "hoteling" (scheduled and shared work stations) and "hot desking" (unassigned, first-come, first-served desk selection) are not being implemented but could be for appropriate groups within each agency. Telework, hoteling, and hot desking (see defintions at right) all reduce total building population and thus lower the total GSF to be constructed. If all state employees teleworked one day per week, the resulting 10% to 15% reduction in built area would yield millions of dollars in construction-cost savings. To support the administration's initiatives to promote a "modern day" work environment through the telework policy, FFF applied a 10% reduction in occupancy and net usable square feet.

Workplace policies can reduce square footage requirements.

- Hotelling
  Temporary wrokspaces assigned through a reservation system; typically used by mobile workers but also used by any worker not near his or her assigned workstation.
- Hot desking
  A way of allocating workspaces for use by different poeple ond ifferent shifts or different days; also called desk sharing or shared assigned space.
- Telecommuting
  A component of tlework in which an employee works from home, substituting tlecommunications for the commute to work.

In 2008 the Forrester Mobile Commerce Forecast indicated that workers who travel frequently or telecommute represented 20% of the workforce. Additional studies indicate that over the next five years average white collar worker will spend 30% of their tie working out of the office.

SUMMARY OF USABLE SQUARE FOOTAGE REQUIREMENTS

DEPARTMENT/DIVISION	FTES‡	150SF/PERSON	30% NTG	45% NTG†	REMARKS
AHS: Agency of Human Services*	1,238 (1,024)	185,700 (153,600)	241,410 (199,690)	269,265 (222,720)	1,138 used for Options A, B, C (1,138 reduced to 1,024 for Telework)
ANR: Agency of Natural Resources	384	57,600	74,880	83,520	Located in VSAC and other leased space Possible relocation to Nat. Life
AOT: Agency of Transportation	504	75,600	98,280	N/A	Located in National Life leased space
ACCD: Agency of Commerce & Community Development	89	13,350	17,355	N/A	Located in National Life leased space
TOTALS	2,215	332,250	431,925	352,785	
DOE: Department of Education	161	24,150	31,395	N/A	120 State Street and Berlin

Notes

* For determining occupancy for design options B, C1 and C2,the AHS population of 1,024 reflects a reduction for Telework and translates into smaller square footage requirements shown in parentheses.

† 45% Net to Gross shown only for departments that could return to the Waterbury Campus

‡ “Full Time Equivalent”staff on site, not including BGS maintenance staff to be located at any of the potential sites

NATIONAL LIFE STUDY

For many years the State has leased space in Montpelier's National Life Building, with more than 670 employees working there now. National Life Corporation's recent internal reorganization has opened up additional space for leasing. The State asked FFF to analyze its existing National Life space to see if ANR could use the additional space that would become available in summer 2012. If ANR were to move, its 504 employees would join 504 AOT employeers and 89 ACCD employees, for a total of 977 state workers.

From site visits and plan analysis show we determined that 162,766 net square feet (NSF) would be available in three locations (the Main, North, and Records buildings). With efficient space planning, new work stations, and implementation of electronic records, the space available can house approximately 1,000 occupants or 23 more than the anticipated total of 977. The next step will be to develop conceptual space plans to solidify departments' working together and incorporate their specialized space requirements.

In conclusion, ANR in full can be co-located with AOT and ACCD in leased space at National Life.

FFF will follow up this report with a detailed cost and fitup analysis for expanded government use of the National Life property.

Part 2, Options

Chapter 2: Option A-

Full Return & Reuse

Summary **Option A**

RETURN AND FULL REUSE

Overview

Returning to the Waterbury Complex in the current configuration will provide office space for approximately 1,160 workers, a number consistent with the estimate of actual occupancy before Hurricane Irene. Although 1,500 state employees were assigned to Waterbury, actual occupancy was less than that and is estimated to be 1,200.

- Fully renovating 316,694 square feet to meet modern open-office standards will increase the functionality of the buildings and allow the demolition of buildings totalling 92,821 square feet.
- It is recommended that a number of peripheral buildings be sold for potential redevelopment. These buildings total 48,037 square feet.
- It is recommended that 92,821 square feet of buildings be demolished. These buildings are either in very poor condition and/or have first-floor levels below 428.5 feet, identified as the final flood level on the site in August 2011.

Construction cost: $115,551,106
Project cost: $142,745,926
Area: 368,700 SF (346,700 SF renovation, 22,000 SF new)
Project cost per sq ft: $313
Operating cost: $2,770,000
Insurance: $13 to $25 million + FEMA TBD
Land area/lot size: 44 acres
Permitting process: low intensity
In floodplain?: Yes
Parking: 800 cars
Design standard: LEED Gold, institutional high quality
Staff capacity: 1,160

Advantages

- Re-establishes the status quo and economic value of state workers in Waterbury
- Creates a maximum number of local jobs with construction dollars. Per dollar spent, renovation creates 20-40% more jobs than new construction.
- Safeguards cultural heritage, by protecting and restoring the historic Waterbury Psychiatric Hospital
- Provides an office complex in a beautiful natural setting with an improved campus landscape
- Buildings originally designed for natural ventilation, views and daylighting
- Modifications to the site may provide additional flood protection to the Town of Waterbury
- The site is within walking distance of downtown Waterbury and to the scenic area via recreation path
- Creates a refurbished and modern workplace with healthy environmentally sustainable strategies
- Reuses existing buildings and avoids the substantial environmental impact of new construction
- Offers opportunities for new on-site low carbon power generation and the installation of substantial solar arrays woven into the current cornfields

Disadvantages

- Isolates state workers in small groups in individual buildings
- Does not facilitate flexibility in workforce reorganization (because of individual buildings)
- The majority of the site sits in the 100-year floodplain

Flood cleanup in wet floodproofed existing buildings is more difficult than new construction

Flood Mitigation

The reuse of the site and buildings depends on meeting requirements for creating a safe working environment within a floodplain. Noting that the recent flooding was somewhere between a 100- and 500-year event, the team has assumed design will meet a flood level of 431.5 feet, which exceeds the requirements to protect against flooding that is two feet above the 100-year level.

Lowering the existing parking areas at the perimeter of the site approximately 3 feet will provide for additional storage of water in the event of another flood and decrease the risk to the buildings and possibly the town as well. Each of the buildings on the site will be wet or dry floodproofed. (Refer to the Floodproofing Plan.)

Wet floodproofing minimizes damage to buildings during flood events by abandoning the ground floor, removing all mechanical systems and protecting and isolating the occupied upper floors by installing an insulated air and moisture barrier below the first floor framing. All exposed ground floor walls and floor slabs are treated with a sealant compound to minimize damage and facilitate cleanup from a flood event.

Dry floodproofing is accomplished through the use of flood-damage-resistant materials and techniques to make the ground levels of buildings substantially impermeable to the passage of floodwater. Several systems are possible, but to protect the oldest buildings on the site and avoid the visual intrusion of concrete retaining flood walls around the perimeter of buildings, the system proposed will use flowable fill concrete in the ground floors to brace the exterior walls and counteract the buoyancy effect. Existing door and window openings below the flood level will be infilled with masonry.

Occupancy Calculations

Full renovation of the complex will result in modern facilities with primarily open floor plans; however, efficiency of use will be lower than new construction. Calculations of occupancy assume occupied space will be 55% of the gross square footage as opposed to the 70% usually achieved in new construction.

Building Renovation Summary

- 23 buildings totaling 316,694 sq. ft, ranging from 1 to 4 stories above the ground floor.
- The total building footprint is 149,791 sq.ft.
- The total flood dry floodproofing area is 70,726 sq.ft.
- On-grade parking is provided for approximately 1, 200 cars.
- The buildings to be renovated are a mix of Construction Types, Type I, II and IIIB —brick exterior construction with varying interior construction including wood framing and concrete and steel supporting structures
- Floor-to-floor heights are typically between 10 and 12 feet.

RENOVATION CREATES MORE LOCAL JOBS

A dollar spent on renovation creates 30 to 50 percent more jobs than a dollar for new construction, and the labor is local to the site not at manufacturing plants in other states. —ADVISORY COUNCIL ON HISTORIC PRESERVATION

Building Envelope

- Brick exterior wall construction with granite foundations and detailing.
- Slate roofing.
- Broad-based life-cycle cost/benefit analysis will determine the strategy for windows. Some buildings have relatively new, insulated glazing. In many cases the renovation and restoration of existing windows can achieve the economic, energy, and historic-fabric goals of the project.

Plumbing

- Buildings are served by municipal water and sewer system.
- Where it is in good condition, existing piping will be utilized.
- Implement low-flow fixtures and waterless or very-low-flow urinals to minimize wastewater treatment needs.

Electrical System

- A new 480V, 3 phase electrical system with all elements above flood level
- It is recommended that an emergency generator with capacity for approximately 25% of full load be required
- Building lighting will be energy efficient with an advanced, energy-saving control system that includes fixture dimming and daylighting and occupancy sensors. A mix of high-efficiency fluorescent fixtures and LED fixtures is anticipated. Vermont-sourced decorative lighting will be considered.

Data and Telecommunications System

- A new data and telecommunications system will be provided.
- A VOIP (Voice Over Internet Protocol) telecommunications system is recommended to accommodate current telecommuting and future growth. VOIP phones can be plugged in anywhere on the internet and maintain the same telephone number; an employee working at home could be paged just as easily as if they were at their desk in the office.
- A wireless WiFi network is recommended to allow maximum flexibility and efficiency for the use of staff and visitors.

ACHIEVING NET-ZERO ENERGY IN HISTORIC BUILDINGS

The U.S. General Services Administration unveiled plans in 2011 for the country's first net-zero energy building on the National Register of Historic Places. The 92-year-old Wayne Aspinall Federal Building and Courthouse in Grand Junction, Colorado, will produce as much energy as it consumes in a year by utilizing an energy-saving geothermal heating and cooling system that uses the warmth or cold of the ground to control temperature and a solar-panel array mounted on the roof that is projected to generate enough energy to balance out the electrical demand of the building. The building will also feature state-of-the-art fluorescent light fixtures with wireless controls to adjust lighting in response to natural light levels, and storm windows with solar-control film to reduce demand on heating and cooling.

HVAC

- New heating and air conditioning will be provided, with hot and chilled water circulated by variable AFD pumps.
- The proposed physical plant will consist of a geothermal well system supplanted wood chip biomass boilers.
- DDC (Direct Digital Control) will be provided and allow for energy management and cost control. Operable window management and monitoring will be incorporated to maximize the energy and comfort benefits of the large number of operable windows.

Fire Suppression

- The building will have full sprinkler protection.

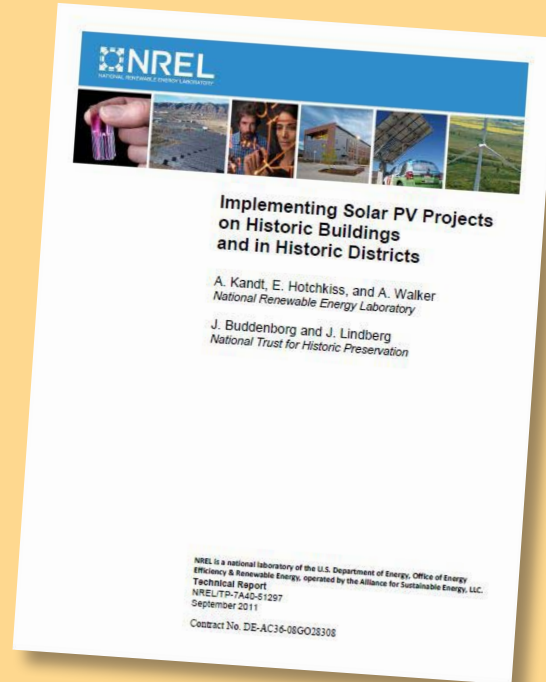
Site Considerations

- The construction of the building in concert with demolition of the lower value buildings will allow substantial improvements to the site for user and public use. Views towards the river will be enhanced and available to many of the workers at the complex.
- Parking will be configured to increase storm water retention capacity.
- See Civil Report for additional detail.

Renewable Energy and Green Building

Many opportunities are available to minimize energy use and promote sustainability. At a minimum, with energy costs anticipated to continue to rise, the application of an energy model based on the LEED-NC requirements for applying ASHRAE standard 90.1 energy modeling should be employed. This renovation option starts from a very strong foundation because it avoids some of the large energy and environmental impacts of new construction.

The improved site provides locations for on-site energy generation form solar and/or wind. Site improvements will encourage walking and other outdoor recreational pursuits. Site development will encourage biking, walking, and cross country skiing, taking advantage of the site's immediate adjacency to the Cross Vermont Trail.



NREL

Implementing Solar PV Projects on Historic Buildings and in Historic Districts

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National Trust for Historic Preservation

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

Technical Report
NREL/TP-7A40-51297
September 2011

Contract No. DE-AC36-08GO28308

SOLAR PV INSTALLATIONS ON HISTORIC BUILDINGS

In late 2011, the National Renewable Energy Lab released a detailed overview of and guide to installing photovoltaic systems on historic buildings and in historic districts.

Deduct for Reduced Renovations

This option assumes a significant level of work to restore the Waterbury Complex and create modern workplaces within its remaining structures (Chapters 2–6 describe this work in more detail). The cost of Option A reflects the scope of these renovations, both exterior and interior, some of which addressed deferred-maintenance needs the State had identified in a plan to tackle pre-Irene deficiencies. That plan carried a projected annual cost of $2,000,000 to $3,000,000.

Renovation costs under this option can be reduced by minimizing the interior and exterior upgrades defined in the full cost report. Minimizing renovations would include reducing:

- interior wall demolition to open up spaces
- millwork, trim and all finishes
- new furniture and work stations being purchased
- number of windows being replaced,
- area of brick pointing and repair
- roofs being replaced or repaired.

Taken together, these reductions could save $9,000,000 in construction costs. They would, however, require an annual increase in operational costs of approximately $500,000 to $1,000,000. Further study and analysis of renovation reductions is warranted to provide a clearer understanding of the cost-to-benefit impacts of such reductions on occupants returning work at the facility.

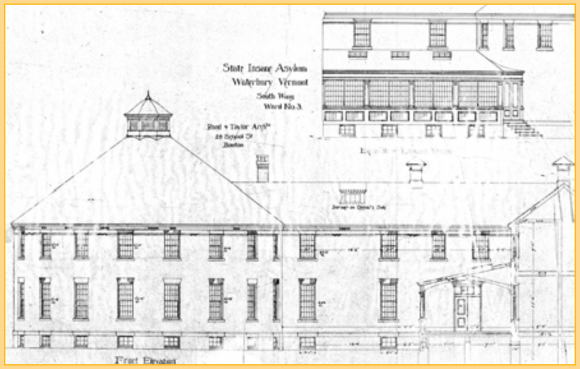
The listed reductions in scope of work could lower construction costs by $9,000,000 in construction, but would raise the operational costs on a yearly basis approximately $500 to $1,000,000.

Further study and analysis of renovation reductions is warranted to better understand the cost to benefit analysis and impacts on the occupants returning to the facility.

SAVING ENERGY AND TAXPAYER DOLLARS

"Government buildings that are renovated with sustainable technologies often see double-digit energy reductions, cumulatively saving taxpayers millions of dollars each year."

—GSA ADMINISTRATOR, MARTHA JOHNSON

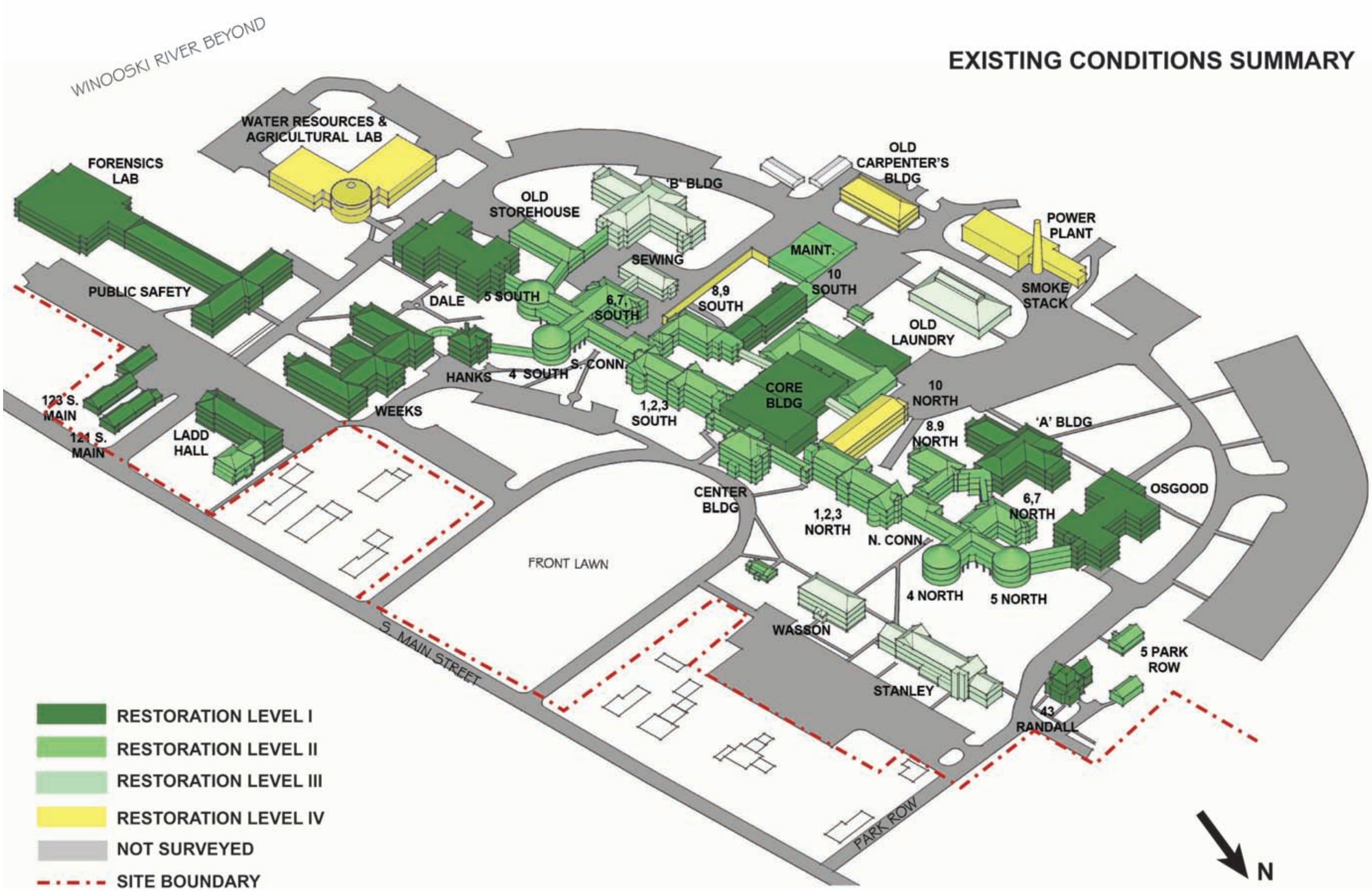


RENOVATION IS GREENER THAN NEW CONSTRUCTION

"It can take between 10 to 80 years for a new energy efficient building to overcome, through efficient operations, the climate change impacts created by its construction."

—FROM THE GREENEST BUILDING: QUANTIFYING THE ENVIRONMENTAL VALUE OF BUILDING REUSE, PRESERVATION GREEN LAB/NATIONAL TRUST FOR HISTORIC PRESERVATION, 2012

EXISTING CONDITIONS SUMMARY



RESTORATION LEVEL I

RESTORATION LEVEL II

RESTORATION LEVEL III

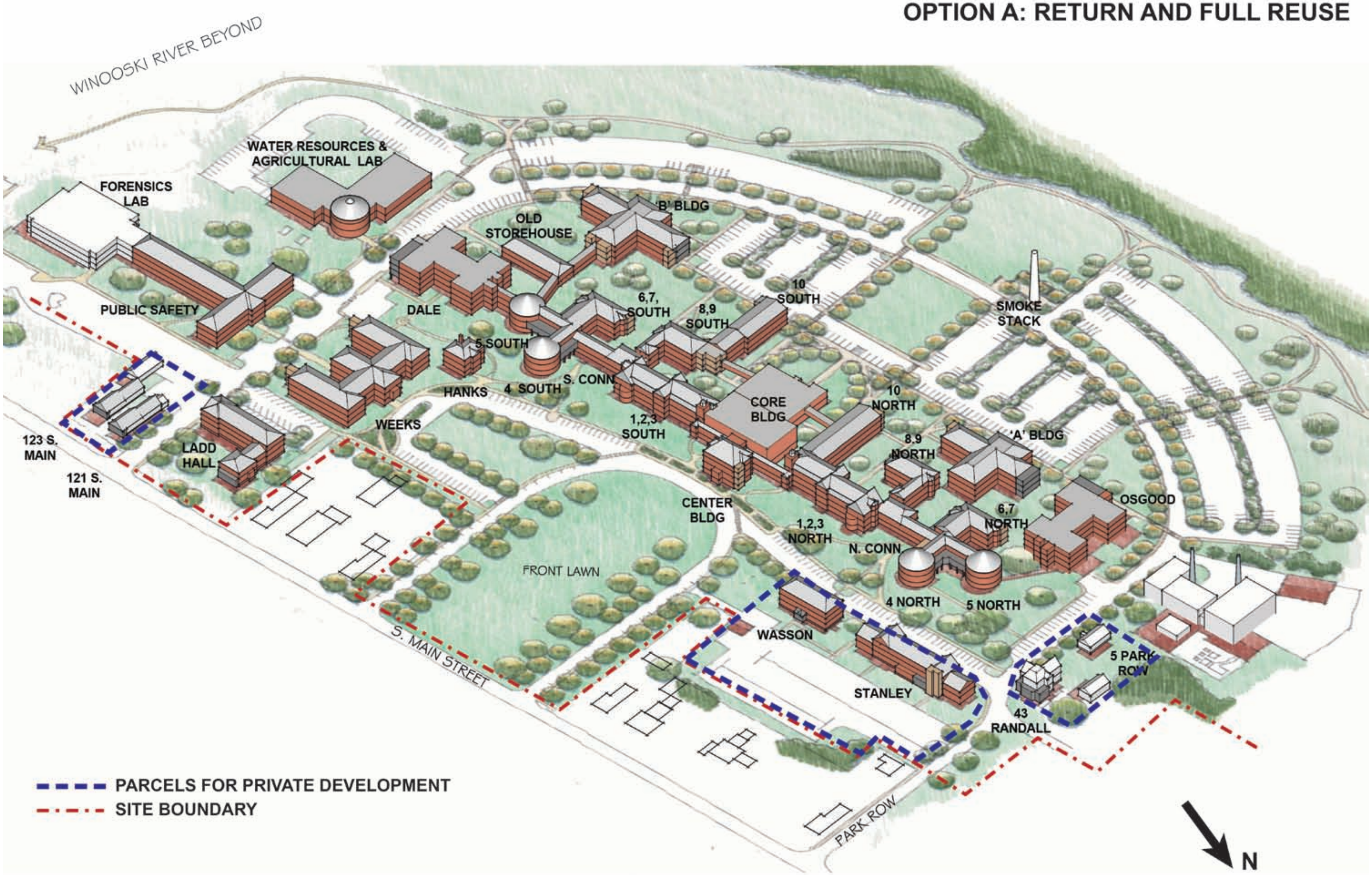
RESTORATION LEVEL IV

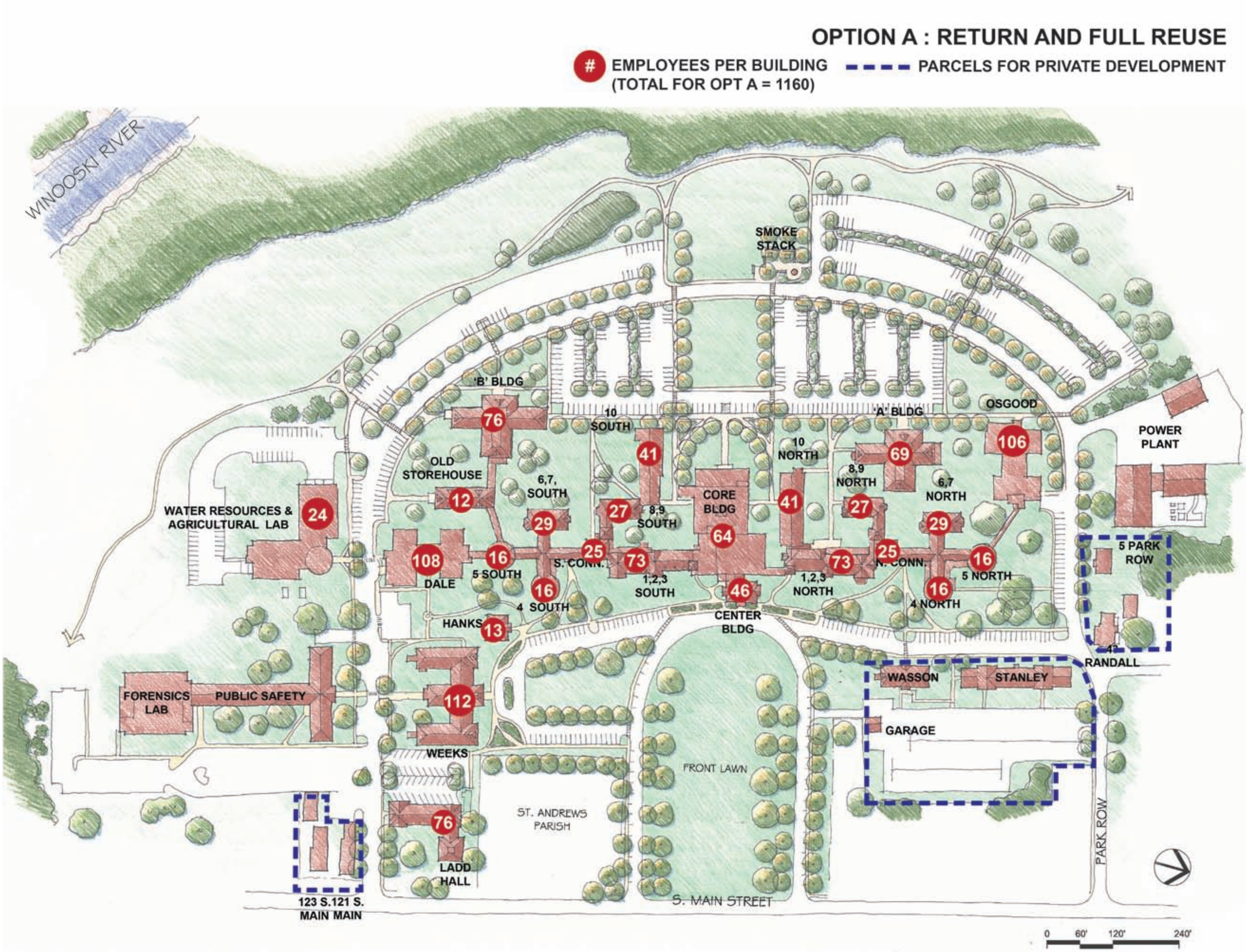
NOT SURVEYED

SITE BOUNDARY

* LEVEL I INDICATES LEAST DEGREE OF WORK REQUIRED TO RESTORE A BUILDING, WHILE LEVEL IV INDICATES HIGEST DEGREE OF REPAIRS AND RESTORATION

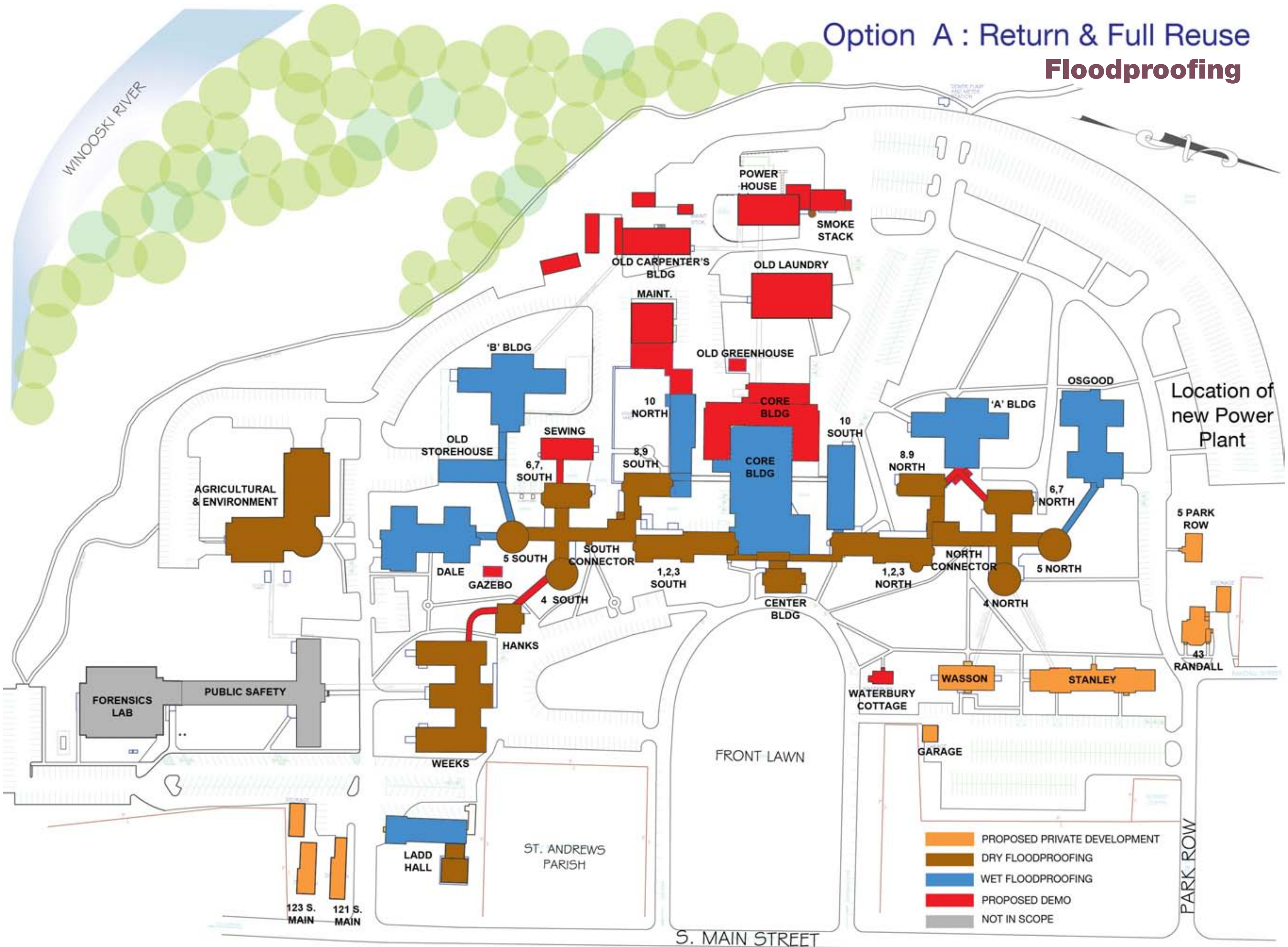
OPTION A: RETURN AND FULL REUSE




OPTION A : RETURN AND FULL REUSE
EMPLOYEES PER BUILDING (TOTAL FOR OPT A = 1160)
PARCELS FOR PRIVATE DEVELOPMENT
WINOOSKI RIVER
SMOKE STACK
'B' BLDG
76
10 SOUTH
41
'A' BLDG
69
OSGOOD
106
POWER PLANT
10 NORTH
OLD STOREHOUSE
12
6,7, SOUTH
CORE BLDG
41
8,9 NORTH
6,7 NORTH
WATER RESOURCES & AGRICULTURAL LAB
24
29
27
8,9 SOUTH
64
27
29
108
16
25
S. CONN.
73
73
25
N. CONN.
16
5 PARK ROW
5 SOUTH
DALE
1,2,3 SOUTH
1,2,3 NORTH
5 NORTH
16
46
16
4 SOUTH
CENTER BLDG
4 NORTH
HANKS
13
RANDALL
WASSON
STANLEY
FORENSICS LAB
PUBLIC SAFETY
112
GARAGE
WEEKS
FRONT LAWN
ST. ANDREWS PARISH
76
LADD HALL
PARK ROW
123 S. MAIN
121 S. MAIN
S. MAIN STREET
0
60'
120'
240'

Option A : Return & Full Reuse

Floodproofing



OPTION A- SUMMARY		
Demolition	84602	GSF
Additional Demolition (porches)	8219	GSF
TOTAL DEMOLITION	**92821**	**GSF**
Renovation	313876	GSF
Additional Renovation (connectors + rebuild of some porches)	2818	GSF
TOTAL RENOVATION (without basement/ground floor)	**316694**	**GSF**
TOTAL RENOVATION (including Ag. Lab Renovation)	**346700**	**GSF**
TOTAL Basement Dry Floodproof	**70726**	**GSF**
TOTAL Basement Wet Floodproof	**79065**	**GSF**
TOTAL NEW (connectors)*	**2000**	**GSF**
TOTAL Private	**48037**	**GSF**

* NEW does not include Power Plant square footage

Building	Gross Area / floor	All Floors	Occupiable floors	Total Occupiable Gross Area (Excluding Basement/Ground floor)	Total Gross Area	Option A Return & Full Reuse	
						Demo/Retained/ Private	Basement/Groundfloor Floodproofing
	SQ.FT.			SQ.FT.	SQ.FT.		
1,2,3 North	6680	4	3	20040	26720	Retained	Dry Floodproof
1,2,3 South	6680	4	3	20040	26720	Retained	Dry Floodproof
10 North	5552	3	2	11104	16656	Retained	Wet Floodproof
10 South	5645	3	2	11290	16935	Retained	Wet Floodproof
121 S. Main St.					2100	Private	NA
123 S. Main St.					2100	Private	NA
4 North	2125	3	2	4250	6375	Retained	Dry Floodproof
4 South	2125	3	2	4250	6375	Retained	Dry Floodproof
43 Randall St.					4033	Private	NA
5 North	2125	3	2	4250	6375	Retained	Dry Floodproof
5 Park Row					2132	Private	NA
5 South	2125	3	2	4250	6375	Retained	Dry Floodproof
6,7 North	3922	3	2	7844	11766	Retained	Dry Floodproof
6,7 South	3922	3	2	7844	11766	Retained	Dry Floodproof
8,9 North	3592	3	2	7184	10776	Retained	Dry Floodproof
8,9 South	3617	3	2	7234	10851	Retained	Dry Floodproof
A Bldg	9380	3	2	18760	28140	Retained	Wet Floodproof
B Bldg	10325	3	2	20650	30975	Retained	Wet Floodproof
Center Building	3116	5	4	12464	15580	Retained	Dry Floodproof
Connector b/w 1,2,3 N & S	1739	2	1	1739	3478	Retained	Dry Floodproof
Connector b/w A Bldg & 8,9,6,7 South	1153	3	2	2306	3459	Demo	NA
Connector b/w B Bldg & Old Storehouse	674	2	1	674	1348	Retained	Wet Floodproof
Connector b/w Dale & 5 South	363	3	2	726	1089	Retained	Wet Floodproof
Connector b/w Hanks & 4 South	530	1	1	530	530	Demo	NA
Connector b/w Hanks & Weeks	698	1	1	698	698	Demo	NA
Connector b/w Old Storehouse & 4 South	663	2	1	663	1326	Retained	Wet Floodproof
Connector b/w Osgood & 5 North	761	3	2	1522	2283	Retained	Wet Floodproof
Connector b/w Sewing Bldg & 6,7 South	321	2	1	321	642	Demo	NA
Core Building (higher part)	17371	2	1	17371	34742	Retained	Wet Floodproof
Core Building (lower part)	18142	2	1	18142	36284	Demo	NA
Dale	9776	4	3	29328	39104	Retained	Wet Floodproof
Garage near Wasson	600	1	1	600	600	Private	NA
Hanks Bldg	1764	3	2	3528	5292	Retained	Dry Floodproof
Ladd Hall (newer Bldg)	4707	4	3	14121	18828	Retained	Wet Floodproof
Ladd Hall (older bldg)	2210	3	3	6630	6630	Retained	Dry Floodproof
Maintenance	8561	1	1	8561	8561	Demo	NA
North Connector Bldg (higher part)	1884	3	2	3768	5652	Retained	Dry Floodproof
North Connector Bldg (lower part)	2965	2	1	2965	5930	Retained	Dry Floodproof
Old Carpenters Bldg	4393	2	2	8786	8786	Demo	NA
Old Greenhouse	532	1	1	532	532	Demo	NA
Old Laundry	8509	1	1	8509	8509	Demo	NA
Old Power House	7701	1	1	7701	7701	Demo	NA
Old StoreHouse	3231	2	1	3231	6462	Retained	Wet Floodproof
Osgood	9617	4	3	28851	38468	Retained	Wet Floodproof
Sewing Bldg	2458	2	2	4916	4916	Demo	NA
Sheds beside Old Carpenters Bldg	2690	1	1	2690	2690	Demo	NA
South Connector Bldg (higher part)	1884	3	2	3768	5652	Retained	Dry Floodproof
South Connector Bldg (lower part)	2965	2	1	2965	5930	Retained	Dry Floodproof
Stanley Hall (higher part)	4884	4	3	14652	19536	Private	NA
Stanley Hall (lower part)	2112	2	2	4224	4224	Private	NA
Wasson hall	3328	4	3	9984	13312	Private	NA
Waterbury Cottage	647	2	2	1294	1294	Demo	NA
Weeks Bldg	15286	3	2	30572	45858	Retained	Dry Floodproof

Part 2, Options

Chapter 3: Option B-

Partial Reuse of Waterbury Complex

Summary Option B
PARTIAL REUSE AND NEW CONSTRUCTION

Overview

Option B renovates the most valuable, historically significant, and useful buildings on the existing campus while adding a major new, state-of-the-art building. This blended Waterbury Complex will provide office space for approximately 1,160 workers, a number consistent with the estimate of actual occupancy before Hurricane Irene. Although 1,500 state employees were assigned to Waterbury, actual occupancy was less than that—an estimated 1,200.

- Fully renovating 117,700 square feet to meet modern open office standards will increase the functionality of the buildings.
- Demolition of 310,349 square feet of the least significant and most vulnerable to future flooding buildings. These buildings are either in very poor condition and/or have first-floor levels below 428.5 feet, identified as the final flood level on the site in August 2011.
- New construction of 115,830 square feet to create a consolidated office complex attached to the historic spine.
- It is recommended that a number of peripheral buildings be sold for potential redevelopment.

This re-use and new construction balances the preservation and re-use of the historical Waterbury complex with the realities of its location on a flood plain and the real advantages of a new, purpose-built Vermont state office building.

Construction cost: $105,644,978
Project cost: $134,291,281
Area: 253,530 SF (117,700 SF renovation, 135,830 SF new)
Project cost per sq ft: $417
Operating cost: $2,365,000
Insurance/FEMA: $13 to $25 million + FEMA TBD
Land area/lot size: 30 acres
Permitting process: low to medium Intensity
In floodplain?: Yes—new construction elevated
Parking: 800 cars (140 under new building)
Design standard: LEED Gold, institutional high quality
Staff capacity: 1,024

Advantages

- Re-establishes the status quo and economic value of state workers in Waterbury
- Creates a substantial number of local jobs with construction dollars with it balance of renovation and new construction
- Safeguards cultural heritage, by protecting and restoring the core of the historic Waterbury Psychiatric Hospital
- Provides an office complex in a beautiful natural setting with an improved campus landscape.
- With a balance of relatively narrow existing buildings and the large open floor plates of the new building allows appropriate and efficient matching of space to departmental and functional needed
- Modifications to the site may provide additional flood protection to the Town of Waterbury
- The site is within walking distance of downtown Waterbury and to the scenic area via recreation path
- Creates a refurbished and modern workplace with healthy environmentally sustainable strategies
- The reuse of existing buildings and reduces the substantial environmental impact of an all new construction option
- Offers opportunities for new on-site low-carbon power generation and the installation of substantial solar arrays (in the current cornfields)

- Incorporates a wide array of sustainable features in the new structure, including an emphasis on using Vermont-sourced materials such as granite, slate, and Vermont woods.

The new building, with its large open floor plates, allows flexible and open groupings of workers that have been shown to improve productivity and worker satisfaction.

Disadvantages

Demolishes a substantial number of existing buildings.

A majority of the site sits in the 100-year flood -plain.

Flood Mitigation

The reuse of the site and buildings is dependent upon meeting requirements for creating a safe working environment within a flood plain. Noting that the recent flooding was somewhere between a 100 and 500-year event. The team has assumed design will meet a flood level of 431.5 which exceeds the requirements to protect against flooding that is two feet above the 100-year level.

Lowering the existing parking areas at the perimeter of the site approximately 3 feet will provide for additional storage of water in the event of another flood and decrease the risk to the buildings and possibly the town as well. The new building on the site and its connectors will be wet floodproofed and the retained existing buildings will be dry flood proofed.

Wet floodproofing minimizes damage to buildings during flood events by abandoning the ground floor, removing all mechanical systems and protecting and isolating the occupied upper floors by installing an insulated air and moisture barrier below the first floor framing. All exposed ground-floor walls and floor slabs are treated with a sealant compound to minimize the damage and facilitate cleanup from a flood event.

Dry floodproofing is accomplished through the use of flood damage-resistant materials and techniques to make the ground levels of buildings substantially impermeable to the passage of floodwater. Several systems are possible, but to protect the oldest buildings on the site and avoid the visual intrusion of concrete retaining flood walls around the perimeter of buildings, the system proposed will use flowable fill concrete in the ground floors to brace the exterior walls and counteract the buoyancy effect. Existing door and window openings will be infilled with masonry.

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A dollar spent on renovation creates 30 to 50 percent more jobs than a dollar for new construction, and the labor is local to the site not at manufacturing plants in other states. —*ADVISORY COUNCIL ON HISTORIC PRESERVATION*

Occupancy Calculations

The renovated portion of the complex will result in modern facilities with primarily open floor plans, however efficiency of use will be lower than for the new building. Calculations of occupancy assume occupied space in the renovated buildings will be 55 percent of the gross square footage as opposed to the 70% efficiency projected for the new building.

Building Construction Summary

- 14 buildings totaling 271,433 sq. ft ranging from 1 to 4 stories (above the Ground Floor)
- The building footprint is 105916 sq.ft.(New addition = 54,450 sq.ft.)
- The total 'Dry Floodproofing' area is 51466 sq. ft. and total 'Wet Floodproofing' area is 54450 sq.ft.
- On grade parking is provided for ~1200 cars
- Floor-to-floor heights are typically between 10 and 12 feet
- Parking on grade below the new buildings occupied floors reduces the parking area footprint for the complex.

New Building

- The building is 115,830 sq. ft; three stories over one level of on-grade parking (Parking = 54,450 sq.ft.)
- The building footprint is 54,450 sq ft.
- The ground floor will be 5´-6˝above the 100-year flood elevation, and there will be no basement.
- Ground level parking plate sits two feet below grade.
- Type II A construction—sprinklered, with protected steel-frame, cast-in-place concrete where appropriate for flood resistance.
- Floor-to-floor heights are match adjacent existing construction and are typically 11´.
- Exterior cladding will be a mix of Vermont stone, glazing (windows), and unit masonry. Masonry options include brick veneer or rainscreen systems with natural or glazed terra cotta, ceramic panel, or small-scale modular Vermont slate and/or granite.
- Light-gauge metal-framed exterior walls with at least R-20 of continuous insulation placed entirely outboard of the framing and sheathing. Note that all insulation outboard of the framing achieves rough equivalency with R-50 insulation placed between metal studs, both in effective R-value and by blockage of thermal conductance through the framing.
- Continuous roof insulation at R-50 or higher.

ACHIEVING NET-ZERO ENERGY IN HISTORIC BUILDINGS

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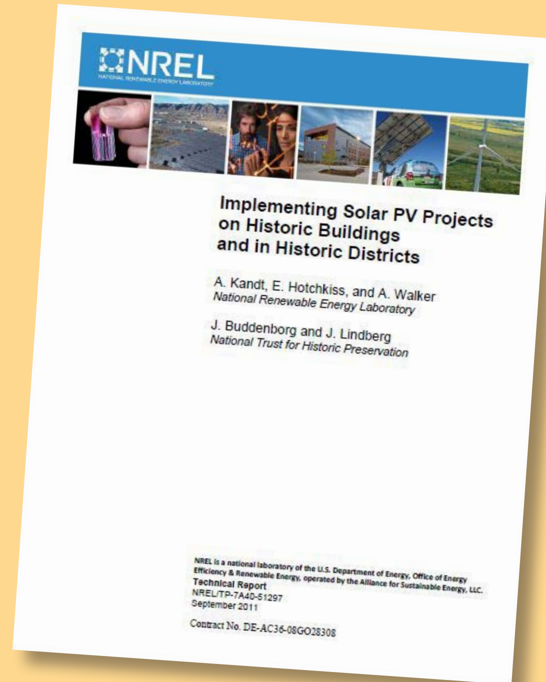
- R-15 or higher insulation at sub-grade walls and floors.
- Windows shall be limited to 40% of the wall surface area and shall be a combination of triple pane insulated units with argon fill and a high performance curtainwall system. Glazing should be limited to the area between 30″ above the finish floor and the height of the finished ceiling. Glazing U-values below 0.2 and are recommended. For window units, an assembly U-value of below 0.25 is recommended, and for curtainwall assemblies, a U-value below 0.33 is recommended.
- Window coatings and performance should be “tuned” to the solar orientation, to take advantage of passive solar heating on the south elevation in wintertime while avoiding solar gain on eastern and western exposures in the summertime.
- Light shelves at the interior of the windows are recommended in order to bring natural light deeper into the building.
- Air tightness plays a very large role in energy efficiency in our variable climate. A continuous air/ vapor barrier at the exterior portion of the envelope should be specified with careful detailingat windows, doors, changes in plane, and expansion joints. With all of the insulation outboardof structural elements, a vapor barrier at the interior side of the framing is not necessary. HVAC
- The proposed physical plant will consist of a geothermal well system supplemented by wood-chip biomass boilers.
- Hot and chilled water will be circulated to a heat-pump system by variable AFD pumps.
- The new boiler plant is elevated above the 500-year floodplain.
- A rooftop penthouse is proposed to house an energy-recovery ventilator.
- Given the high-performing building envelope described, perimeter radiation (heat near the windows) will not be required except at areas with curtainwall glazing.

Plumbing

- The building will be served by a municipal water and sewer system.
- Implement low flow fixtures and waterless urinals to minimize wastewater treatment needs.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September 2011

Contract No. DE-AC36-08GO28308

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Electrical System

- The service requirement for a conventional project this size is 480V, 3 phase, 3,000amp.
- An emergency generator with capacity for approximately 25% of full load is also required.
- Electrical systems should be selected for maximum energy efficiency. T5HO and LED lamping, occupancy sensors, and daylighting controls are recommended. Our design includes light shelves to help daylight reach further into the building.
- This project offers opportunities for the use of photovoltaic (PV) solar energy systems. In this case, PV screens in the parking lot or site-mounted solar trackers are suggested. Other than the panel mounting locations, the PV system described in section D of the MEP report (Chapter 13) is applicable to this option.

Data and Telecommunications

- A VOIP (Voice Over Internet Protocol) telecommunications system is recommended to accommodatecurrent telecommuting and future growth. VOIP phones can be plugged in anywhere on the internet and maintain the same telephone number; an employee working at home could be paged just as easily as if they were at their desk in the office.
- An MDF room in the basement will distribute via multiple 4˝conduit risers to three IDF rooms on each floor with ladder-type cable tray distribution from each IDF room to all work areas.

Fire Suppression

- The building will have full sprinkler protection.

Site Considerations

- The construction of the building in concert with demolition of the lower value buildings will allow substantial improvements to the site for user and public use. Views towards the river will be enhanced and available to many of the workers at the complex.
- Parking will be configured to increase storm water retention capacity.
- See Civil Report for additional detail.

Renewable Energy and Green Building

The orientation of the site, with good solar access and protection from cold northwest winds, offers opportunities for sustainable building. Attempting a “Net Zero Building” (which requires all energy to be produced on-site), would also help mitigate project impacts. At a minimum, with energy costs anticipated to continue to rise, the application of an

SAVING ENERGY AND TAXPAYER DOLLARS

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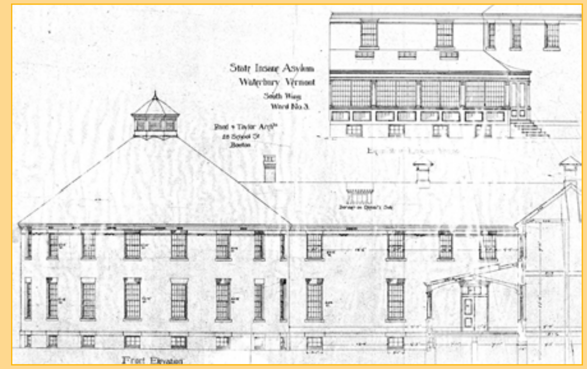

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energy model based on the LEED-NC requirements for applying ASHRAE standard 90.1 energy modeling should be employed, targeting an energy use reduction of at least 25% when compared to a baseline model. The site also offers the opportunity to meet the Living Building Challenge, a standard described on pages xxxxxx . The Living Building Challenge is considered a more rigorous path for reducing environmental impacts of construction and building operation and for creating a healthy work place.

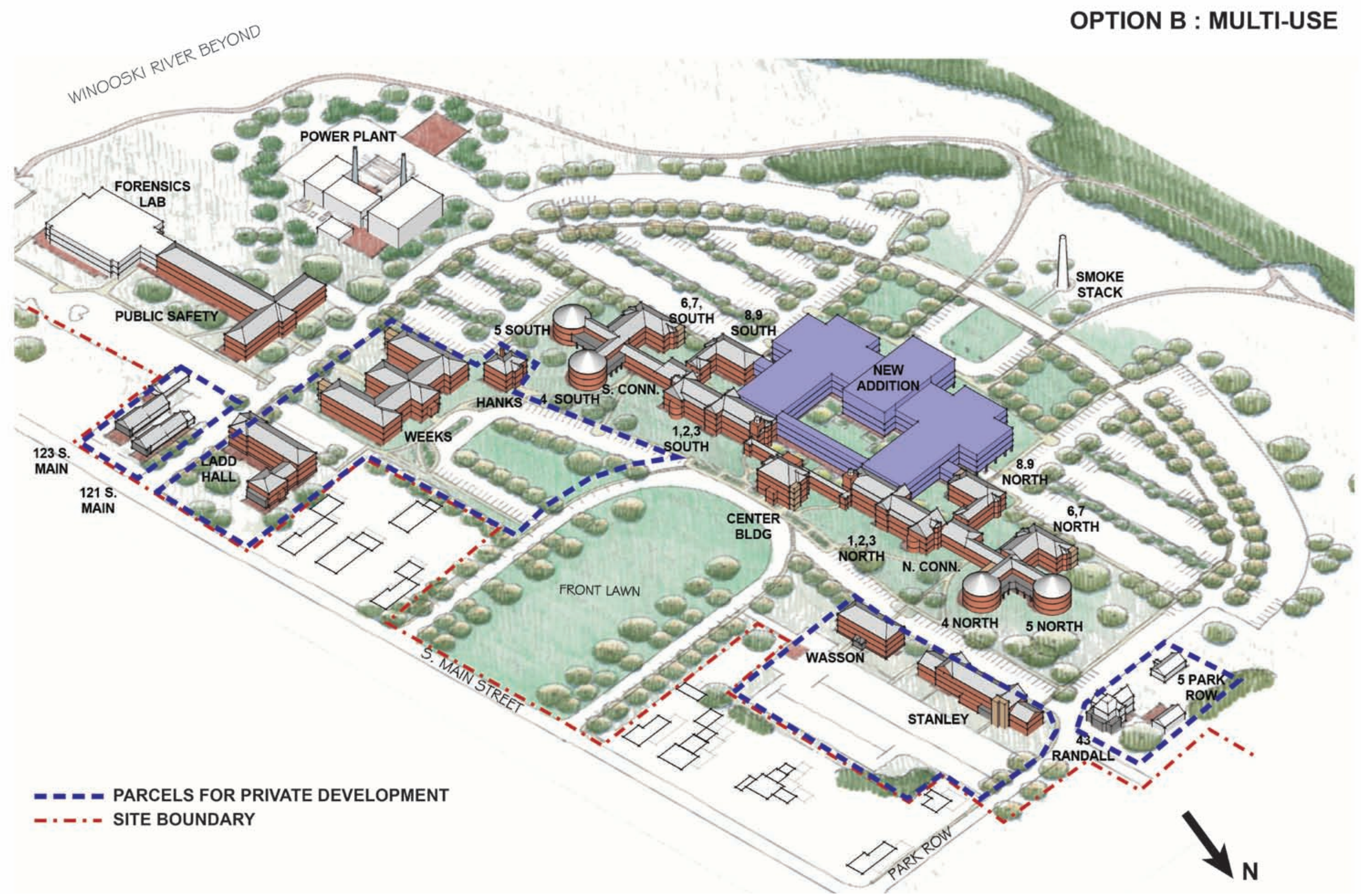
Because almost half of the building area needed will be renovation, the overall carbon footprint of the complex is much lower than all new construction. New construction creates substantially more Green House Gas Emissions than renovation. Studies indicate that high performance new construction requires anywhere from 20 to 80 years of operation before the Green House Gas created by of construction is equal to the amount of Green House Gas avoided through high performance operation.

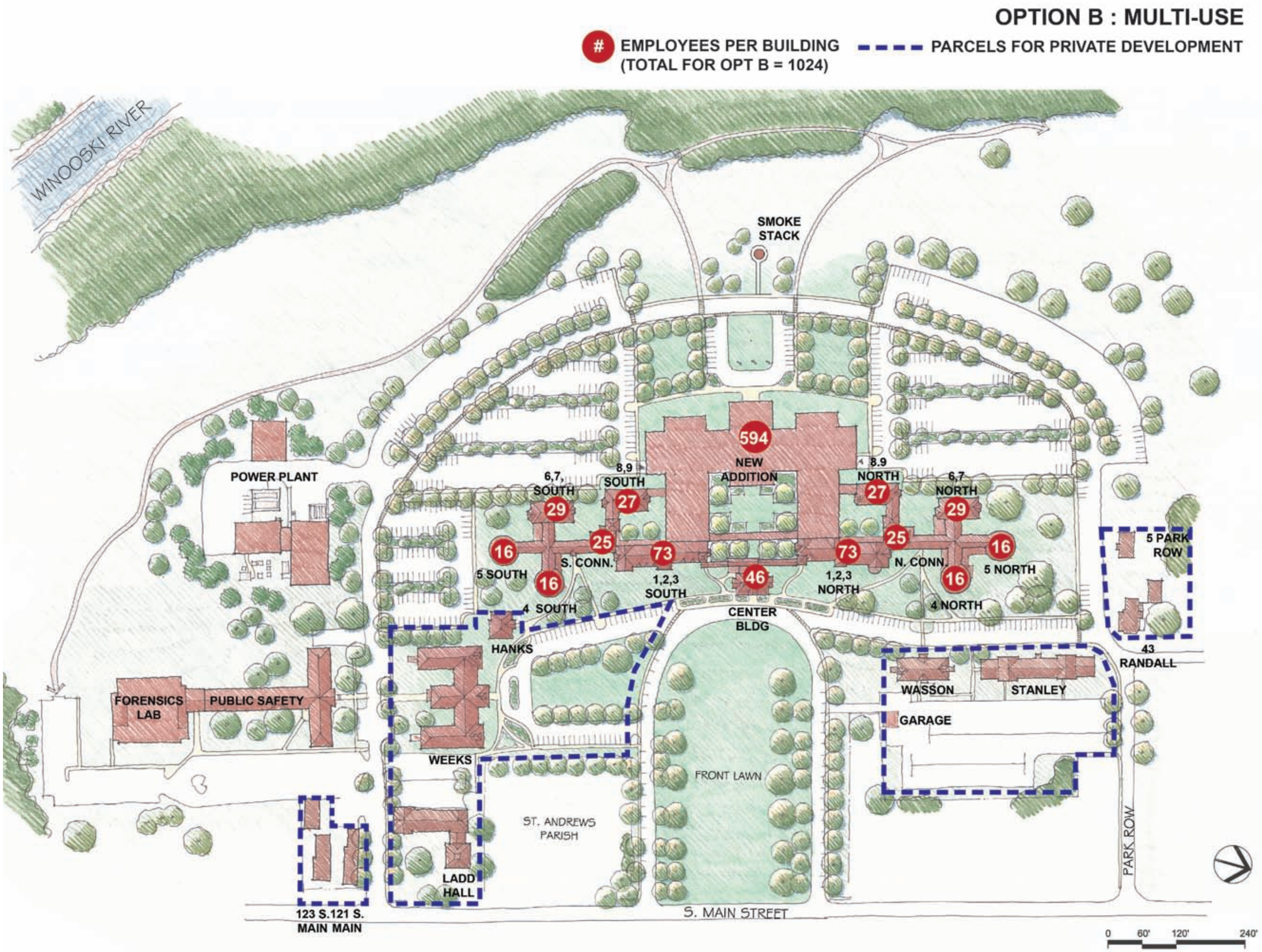
HIGH-PERFORMANCE BUILDINGS

"High-performance building means a building that integrates and optimizes on a life cycle basis all major high performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit productivity, sustainability, functionality and operational considerations"

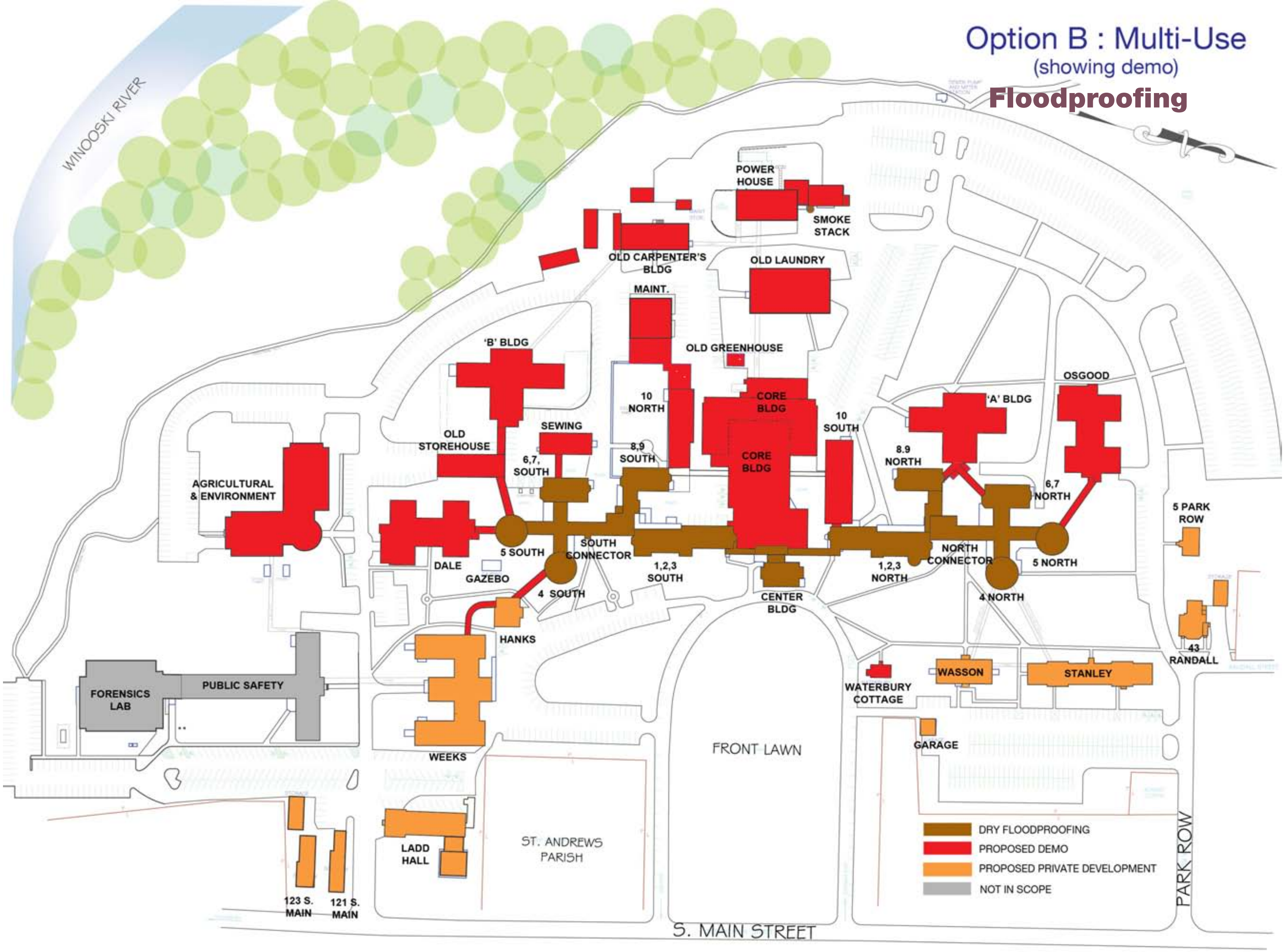
—ENERGY INDEPENDENCY AND SECURITY ACT OF 2007 SEC 401 (PL 110-140)

OPTION B : MULTI-USE

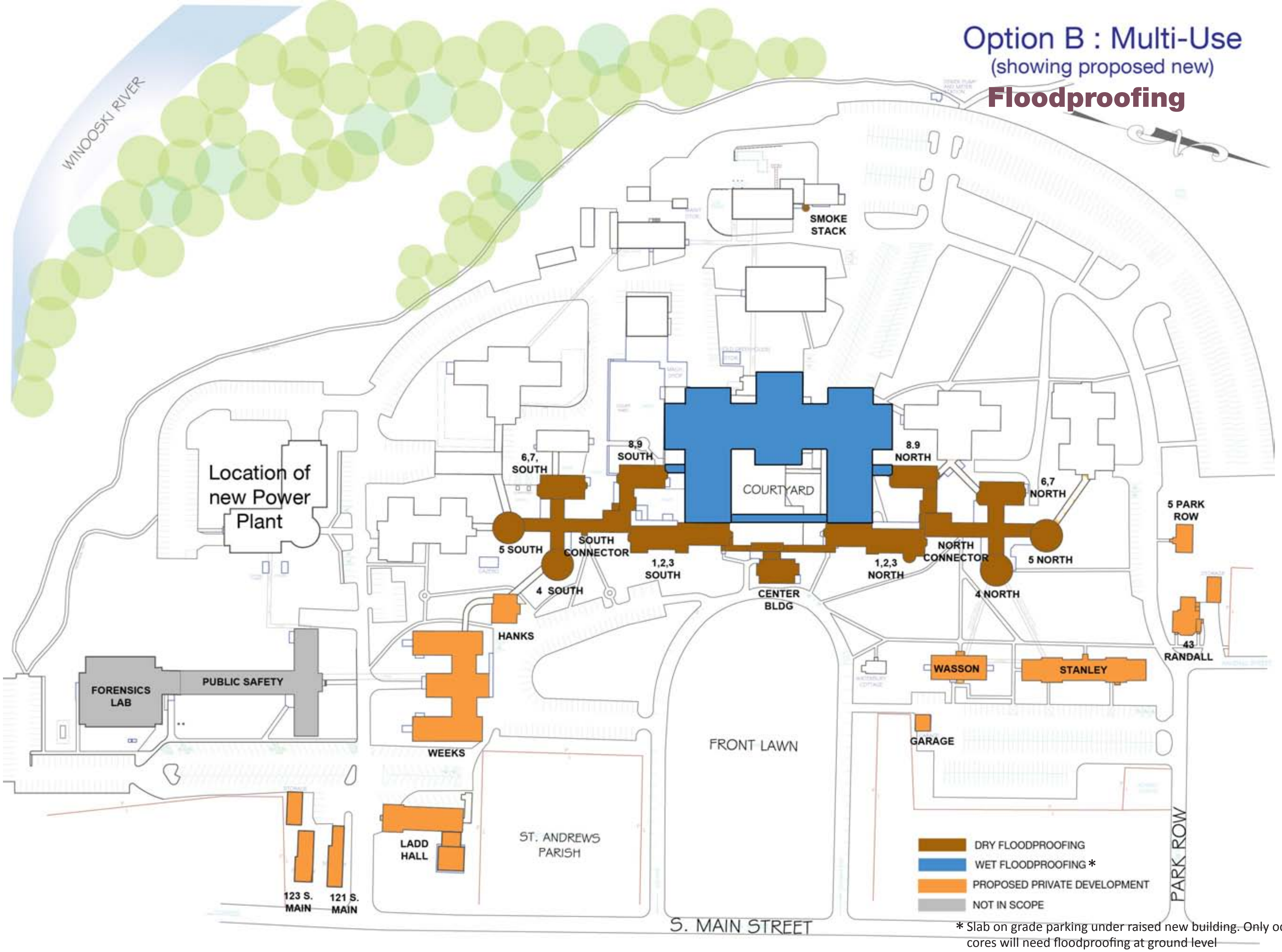




OPTION B : MULTI-USE
EMPLOYEES PER BUILDING
(TOTAL FOR OPT B = 1024)
PARCELS FOR PRIVATE DEVELOPMENT
WINOOSKI RIVER
SMOKE STACK
594
NEW ADDITION
POWER PLANT
6,7, SOUTH
29
8,9 SOUTH
27
8.9 NORTH
27
6,7 NORTH
29
16
25
73
46
73
25
16
5 SOUTH
16
S. CONN.
1,2,3 SOUTH
1,2,3 NORTH
N. CONN.
16
5 NORTH
5 PARK ROW
4 SOUTH
CENTER BLDG
4 NORTH
HANKS
43 RANDALL
WASSON
STANLEY
FORENSICS LAB
PUBLIC SAFETY
GARAGE
WEEKS
FRONT LAWN
ST. ANDREWS PARISH
PARK ROW
LADD HALL
123 S. MAIN
121 S. MAIN
S. MAIN STREET
0
60'
120'
240'


Option B : Multi-Use
(showing demo)
Floodproofing
WINOOSKI RIVER
POWER HOUSE
SMOKE STACK
OLD CARPENTER'S BLDG
OLD LAUNDRY
MAINT.
OLD GREENHOUSE
'B' BLDG
10 NORTH
CORE BLDG
10 SOUTH
'A' BLDG
OSGOOD
OLD STOREHOUSE
SEWING
8,9 SOUTH
CORE BLDG
8,9 NORTH
6,7, SOUTH
6,7 NORTH
AGRICULTURAL & ENVIRONMENT
5 PARK ROW
DALE
5 SOUTH
SOUTH CONNECTOR
1,2,3 SOUTH
1,2,3 NORTH
NORTH CONNECTOR
5 NORTH
GAZEBO
4 SOUTH
CENTER BLDG
4 NORTH
HANKS
43 RANDALL
FORENSICS LAB
PUBLIC SAFETY
WATERBURY COTTAGE
WASSON
STANLEY
WEEKS
GARAGE
FRONT LAWN
LADD HALL
ST. ANDREWS PARISH
123 S. MAIN
121 S. MAIN
S. MAIN STREET
PARK ROW
DRY FLOODPROOFING
PROPOSED DEMO
PROPOSED PRIVATE DEVELOPMENT
NOT IN SCOPE

Option B : Multi-Use
(showing proposed new)
Floodproofing



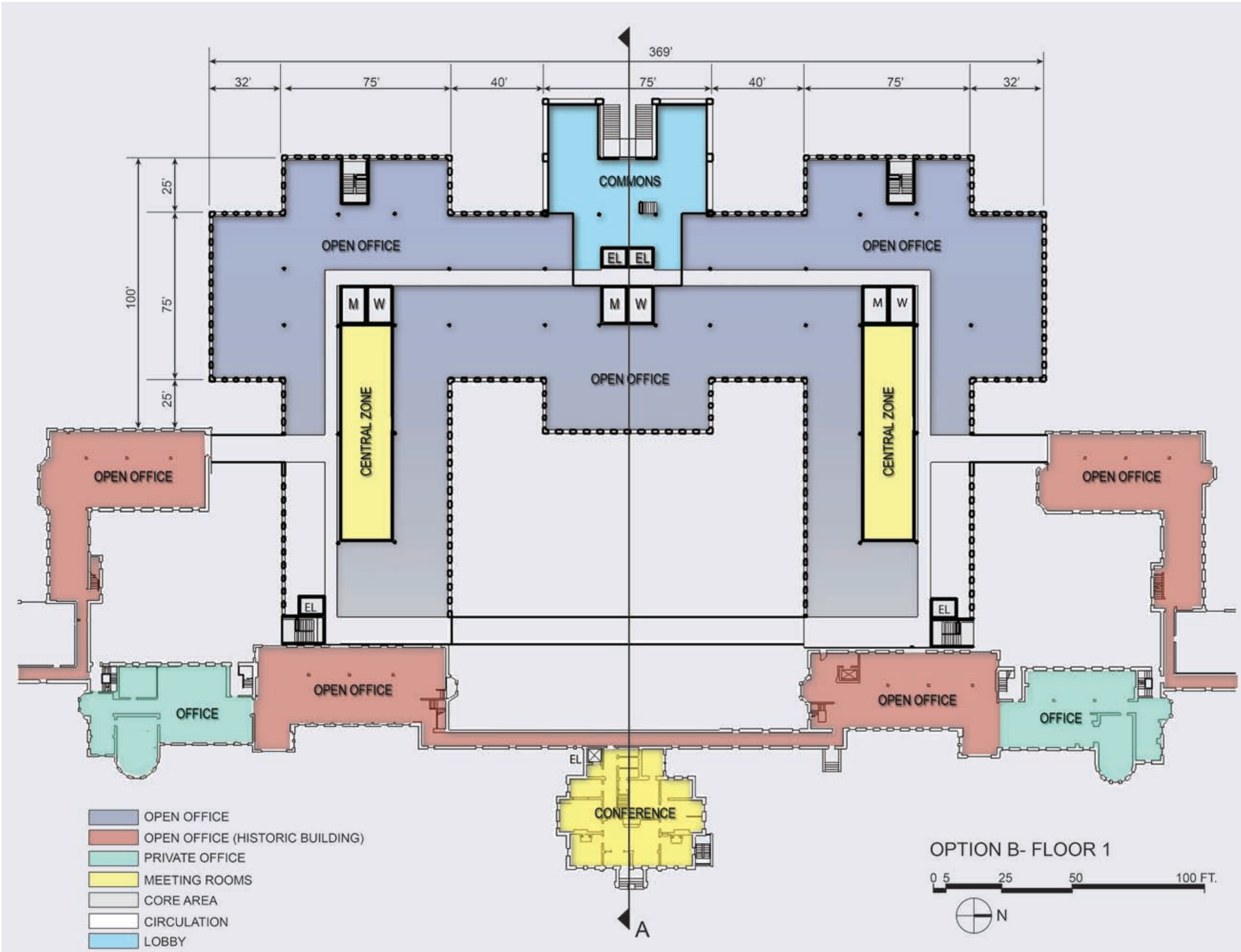
* Slab on grade parking under raised new building. Only occupiable cores will need floodproofing at ground level

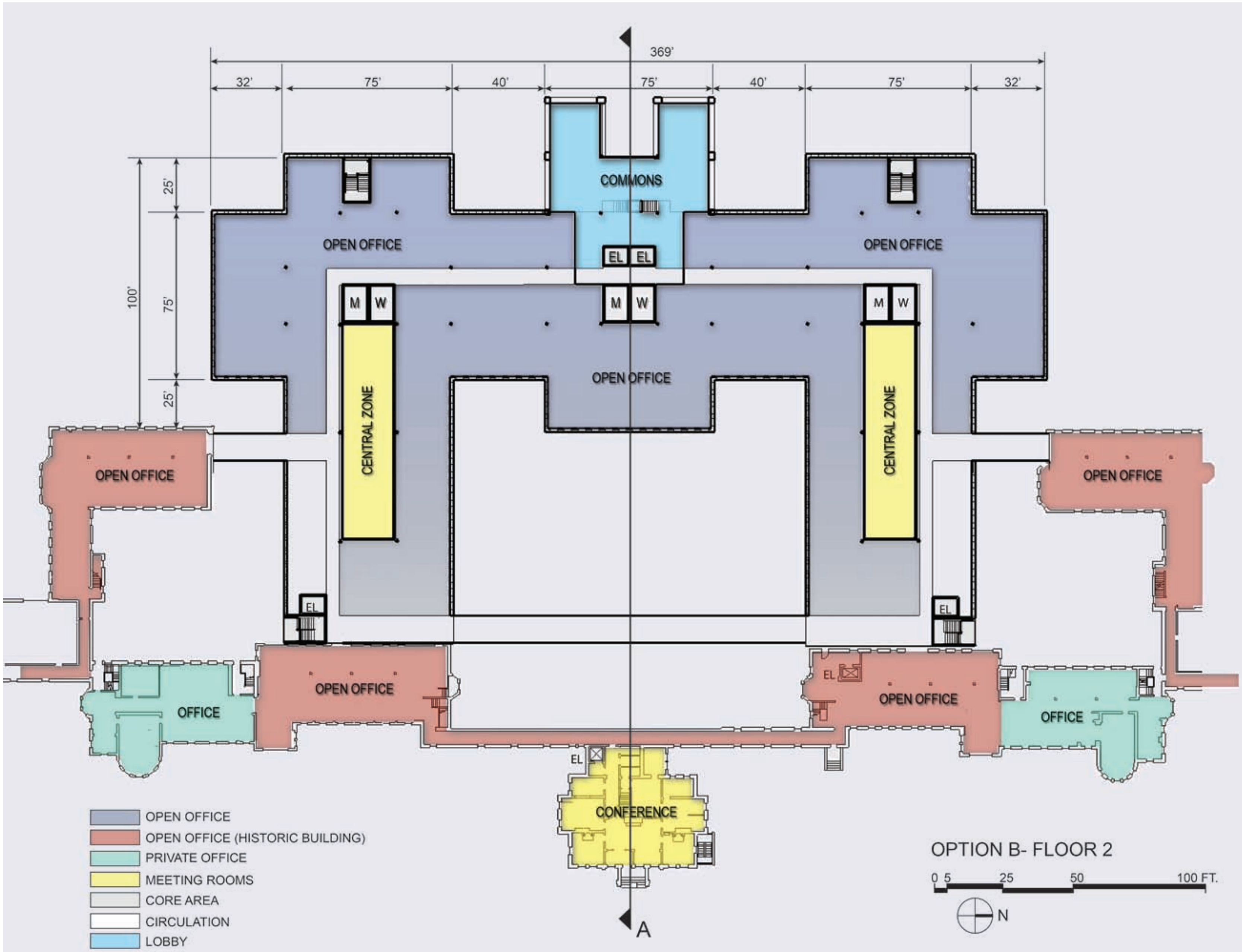
OPTION B - SUMMARY		
Demolition	302130	GSF
Additional Demolition (porches)	8219	GSF
TOTAL DEMOLITION	**310349**	**GSF**
Renovation	114855	GSF
Additional Renovation (connectors + rebuild of some porches)	2845	GSF
TOTAL RENOVATION (without basement/ground floor)	**117700**	**GSF**
TOTAL Basement Dry Floodproof	**51466**	**GSF**
TOTAL NEW (without below-structure parking	**115830**	**GSF**
Below-structure parking	**54450**	**GSF**
TOTAL Private Development	**124645**	**GSF**

* NEW does not include Power Plant square footage

^ None of the retained existing buildings in OPTION B are being Wet Floodproofec

Building	Gross Area / floor	All Floors	Occupiable floors	Total Occupiable Gross Area (Excluding Basement/Ground floor)	Total Gross Area	Option B Multi-Use: Demo/Retained/Private	Option B Multi-Use: Basement/Groundfloor Floodproofing
	SQ.FT.			SQ.FT.	SQ.FT.		
1,2,3 North	6680	4	3	20040	26720	Retained	Dry Floodproof
1,2,3 South	6680	4	3	20040	26720	Retained	Dry Floodproof
10 North	5552	3	2	11104	16656	Demo	NA
10 South	5645	3	2	11290	16935	Demo	NA
121 S. Main St.					2100	Private	NA
123 S. Main St.					2100	Private	NA
4 North	2125	3	2	4250	6375	Retained	Dry Floodproof
4 South	2125	3	2	4250	6375	Retained	Dry Floodproof
43 Randall St.					4033	Private	NA
5 North	2125	3	2	4250	6375	Retained	Dry Floodproof
5 Park Row					2132	Private	NA
5 South	2125	3	2	4250	6375	Retained	Dry Floodproof
6,7 North	3922	3	2	7844	11766	Retained	Dry Floodproof
6,7 South	3922	3	2	7844	11766	Retained	Dry Floodproof
8,9 North	3592	3	2	7184	10776	Retained	Dry Floodproof
8,9 South	3617	3	2	7234	10851	Retained	Dry Floodproof
A Bldg	9380	3	2	18760	28140	Demo	NA
B Bldg	10325	3	2	20650	30975	Demo	NA
Center Building	3116	5	4	12464	15580	Retained	Dry Floodproof
Connector b/w 1,2,3 N & S	1739	2	1	1739	3478	Retained	Dry Floodproof
Connector b/w A Bldg & 8,9,6,7 South	1153	3	2	2306	3459	Demo	NA
Connector b/w B Bldg & Old Storehouse	674	2	1	674	1348	Demo	NA
Connector b/w Dale & 5 South	363	3	2	726	1089	Demo	NA
Connector b/w Hanks & 4 South	530	1	1	530	530	Demo	NA
Connector b/w Hanks & Weeks	698	1	1	698	698	Demo	NA
Connector b/w Old Storehouse & 4 South	663	2	1	663	1326	Demo	NA
Connector b/w Osgood & 5 North	761	3	2	1522	2283	Demo	NA
Connector b/w Sewing Bldg & 6,7 South	321	2	1	321	642	Demo	NA
Core Building (higher part)	17371	2	1	17371	34742	Demo	NA
Core Building (lower part)	18142	2	1	18142	36284	Demo	NA
Dale	9776	4	3	29328	39104	Demo	NA
Garage near Wasson	600	1	1	600	600	Private	NA
Hanks Bldg	1764	3	2	3528	5292	Private	NA
Ladd Hall (newer Bldg)	4707	4	3	14121	18828	Private	NA
Ladd Hall (older bldg)	2210	3	3	6630	6630	Private	NA
Maintenance	8561	1	1	8561	8561	Demo	NA
North Connector Bldg (higher part)	1884	3	2	3768	5652	Retained	Dry Floodproof
North Connector Bldg (lower part)	2965	2	1	2965	5930	Retained	Dry Floodproof
Old Carpenters Bldg	4393	2	2	8786	8786	Demo	NA
Old Greenhouse	532	1	1	532	532	Demo	NA
Old Laundry	8509	1	1	8509	8509	Demo	NA
Old Power House	7701	1	1	7701	7701	Demo	NA
Old StoreHouse	3231	2	1	3231	6462	Demo	NA
Osgood	9617	4	3	28851	38468	Demo	NA
Sewing Bldg	2458	2	2	4916	4916	Demo	NA
Sheds beside Old Carpenters Bldg	2690	1	1	2690	2690	Demo	NA
South Connector Bldg (higher part)	1884	3	2	3768	5652	Retained	Dry Floodproof
South Connector Bldg (lower part)	2965	2	1	2965	5930	Retained	Dry Floodproof
Stanley Hall (higher part)	4884	4	3	14652	19536	Private	NA
Stanley Hall (lower part)	2112	2	2	4224	4224	Private	NA
Wasson hall	3328	4	3	9984	13312	Private	NA
Waterbury Cottage	647	2	2	1294	1294	Demo	NA
Weeks Bldg	15286	3	2	30572	45858	Private	NA


369'
32'
75'
40'
75'
40'
75'
32'
100'
25'
75'
25'
COMMONS
EL
EL
OPEN OFFICE
OPEN OFFICE
M
W
M
W
M
W
OPEN OFFICE
CENTRAL ZONE
CENTRAL ZONE
OPEN OFFICE
OPEN OFFICE
EL
EL
OPEN OFFICE
OPEN OFFICE
OFFICE
OFFICE
EL
CONFERENCE
OPEN OFFICE
OPEN OFFICE (HISTORIC BUILDING)
PRIVATE OFFICE
MEETING ROOMS
CORE AREA
CIRCULATION
LOBBY
OPTION B- FLOOR 1
0 5 25 50 100 FT.
N
A


369'
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COMMONS
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OPEN OFFICE
CENTRAL ZONE
CENTRAL ZONE
OPEN OFFICE
OPEN OFFICE
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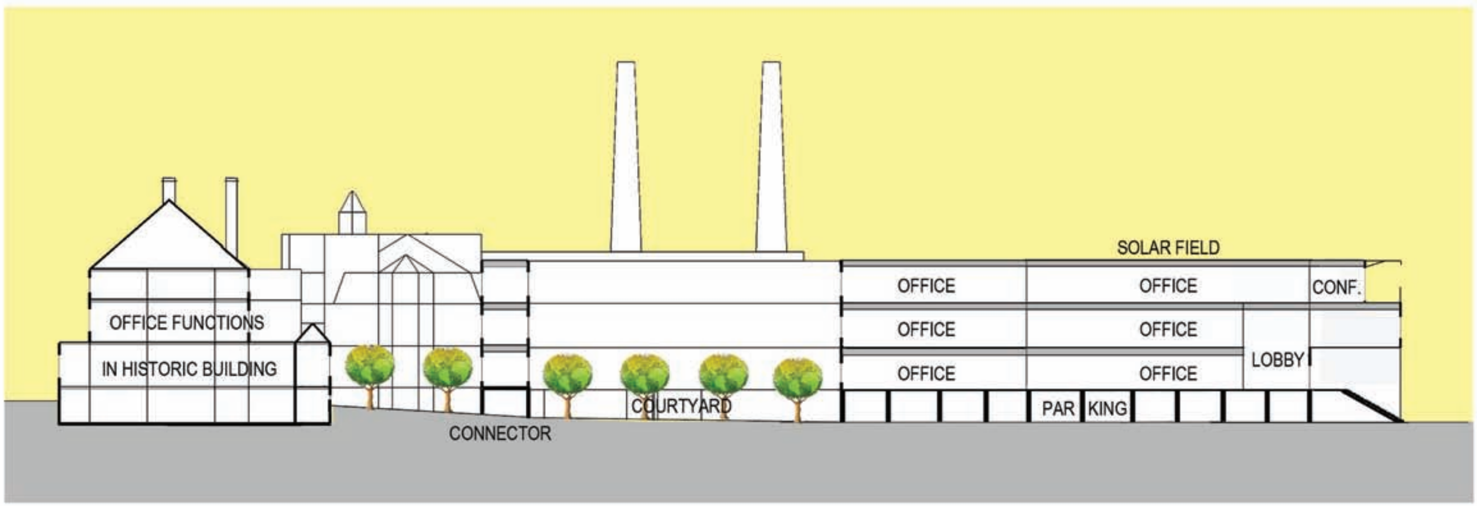
OFFICE
OPEN OFFICE
EL
OPEN OFFICE
OFFICE
EL
CONFERENCE
OPEN OFFICE
OPEN OFFICE (HISTORIC BUILDING)
PRIVATE OFFICE
MEETING ROOMS
CORE AREA
CIRCULATION
LOBBY
A
OPTION B- FLOOR 2
0 5 25 50 100 FT.
N



OPTION B- SECTION A

Part 2, Options

Chapter 4: Option C1-

New Construction, Montpelier Site

Summary **Option C1**

NEW CONSTRUCTION, MONTPELIER SITE

Overview

If the State decides against redevelopment of the Waterbury site, as described in options A and B, a new building consolidating the Agency of Human Services (AHS) at the site of the existing Department of Labor (DOL) building off Memorial Drive in Montpelier would provide enough office additional office space to house workers displaced from Waterbury. This design could house 1,168 workers—the combined total of current AHS staff plus the DOL staff who would be displaced by demolition of the existing building. Unfortunately, the site cannot accommodate this quantity of workers if the existing building remains.

The DOL site, like the Waterbury Complex, is

- In a floodplain
- Adjacent to an existing town center with access to municipal services
- Previously developed

Construction cost: $86,866,734
Project cost: $118,693,070
Area: 227,760SF + 177,000 SF garage
Project cost per sq ft: $381
Operating cost: $1,890,000
Insurance: $13 to $25 million
Land area/lot size: 5.5 acres building, 1.5 acres parking
Permitting process: Medium to high Intensity
In floodplain?: Yes
Parking: 700 cars (262 open site, 438 parking structure)
Design standard: LEED Gold, institutional high quality
Staff capacity: 1,168

Advantages

- The site is upstream of the Waterbury complex and there is less of a catchment area to contribute to major flooding events; flood risk is slightly lower.
- Designing and constructing a new building for a site in a floodplain will more straightforward than retrofitting existing buildings, as in the case of Waterbury
- Site is well served by transit and is adjacent to other state workers in downtown Montpelier and at the National Life complex; it is also connected to services in downtown Montpelier, which are within walking distance by a recreation path.
- Municipal water and sewer serve the site and adequate power and telecom/data infrastructure is present.

Disadvantages

- The proposed design goes beyond what is currently permitted by zoning; the site cannot accommodate the AHS and DOL workers and the required parking while adhering to current zoning regulations. Variances will be required.
- Additional land acquisition may be required; even as designed with a multilevel parking structure, the site cannot accommodate the required parking for workers and visitors as well as fleet vehicle storage and park and ride functions currently located at the DOL property.
- Demolition of the existing DOL building will be required to accommodate the program on this site; there is potential to salvage the granite panel cladding as mitigation, as the building has historical classification. 160 Department of Labor employees would be displaced during construction, but the design allows them to move back

to this site.

- Roadway improvements and traffic signals will be needed.
- A medium intensity Act 250 permitting process would be required, with possible complications due to construction in the floodplain and known archaeological sensitivity.
- “Mothballing” of the Waterbury site incurs expenses and potential liabilities.

Zoning Considerations

This Site, along the Winooski River just of Memorial Drive near I-89 exit 8 in Montpelier, currently supports the Department of Labor building accommodating 160 persons in a 3 story, 53,500 sq.ft. building.

- Existing Zoning District: GB (General Business); Use: Office
- Maximum Height: 3 stories or 45 feet
- Maximum Lot Coverage: 33% for building footprint
- Parking: 1 9x20´ parking space per 250 sq.ft. net usable, yielding 778 parking spaces.

It is not possible to accommodate the required building square footage or parking count under this site classification. Because the purpose of the building is commensurate with CB-I (Central Business Density), we’ve designed to comply with the requirements of that classification and would need to receive a variance to do so.

- Proposed Zoning Variance to follow CB-I regulations; Use: Office
- Maximum Height: 6 stories
- Maximum Lot Coverage: 100%
- Parking: One 9x20´ space per 400 sq.ft. net usable, yielding 486 parking spaces.

The large building and 486 parking spaces illustrated in this design represent a very intensive use of this site, but still are not sufficient to meet current state needs, so the purchase of all or part of the adjacent Green Mountain Power property is suggested to provide additional parking.

BUILDING CONSTRUCTION SUMMARY

AGENCY	FTEs	Net Sq Ft @ 150NSF/person	Gross Sq Ft @ 30% Net-to-Gross factor
Agency of Human Services	1,024	139,776	199,680
Dept of Labor	144	19,656	28,080
Totals	**1,168**	**159,432**	**227,760**

Building Size

- The building is 227,760 sq.ft. 5 stories attached to a four-level parking structure.
- The building footprint is 192,750 sq.ft., or about 38% building coverage on the lot.
- The ground floor will be 2 feet above the 100-year flood elevation, and there will be no basement. Ground-level parking plate is 2 feet below grade.
- Type II A construction—sprinklered, with protected steel frame; all structure within 10' of the 100-year flood elevation will be cast-in-place concrete for flood resistance.
- Floor-to-floor heights are typically 14 feet, with a 16-foot floor-to-roof-deck height at the top floor.
- Parking structure shall be a hybrid design with steel columns and prestressed concrete tees; dimensions are 60´x180´. Structure within 10´ of the 100-year flood elevation will be cast-in-place concrete columns and prestressed tees for flood resistance. The garage will have a 60 ft. span, parking on the ramp, and a green roof over half the garage.

Building Envelope

- Exterior cladding will be a mix of Vermont stone, glazing (windows), and unit masonry. Masonry options include brick veneer or rainscreen systems with natural or glazed terra cotta, or ceramic panel.
- Light-gauge metal-framed exterior walls with at least R-20 of continuous insulation placed entirely outboard of the framing and sheathing. Note that with all insulation outboard of the framing, this is roughly equivalent to R-50 insulation placed between metal studs in effective R-value; by stopping thermal conductance through the framing, it will likely function as well or better than R-50 insulation.
- Continuous roof insulation at R-50 or higher.
- R-15 or higher insulation at sub-grade walls and floors.
- Windows shall be limited to 40% of the wall surface area and shall be a combination of triple-pane insulated units with argon fill and a curtainwall system. Glazing should be limited to the area between 30´´ above the finish

floor and the height of the finished ceiling. Glazing U-values below 0.2 and are recommended. For window units, an assembly U-value of below 0.25 is recommended, and for curtainwall assemblies, a U-value below 0.33 is recommended.

- Window coatings and performance should be "tuned" to the solar orientation, to take advantage of passive solar heating on the south elevation in wintertime while avoiding solar gain on eastern and western exposures in the summertime.
- Light shelves at the interior of the windows are recommended in order to bring natural light deeper into the building.
- Air tightness plays a very large role in energy efficiency in our variable climate. A continuous air/ vapor barrier at the exterior portion of the envelope should be specified with careful detailing at windows, doors, changes in plane, and expansion joints. With all of the insulation outboard of structural elements, a vapor barrier at the interior side of the framing is not necessary.

HVAC

- The proposed physical plant will consist of a geothermal well system supplanted by oil or propane fueled boilers. For a new, tightly constructed building of this size, we'd estimate that an array of small boilers could provide the required heat, while offering scalability to maximize efficiency and offer redundancy.
- Hot and chilled water circulated will be circulated to a heat pump system by variable AFD pumps.
- The boiler plant is located at a lower parking level in the plans and must be elevated above the 500-year floodplain.
- A large overhead door or access areaway should be included to allow replacement equipment, such as a new boiler, to be installed and existing equipment to be removed.
- A rooftop penthouse is proposed to house an energy recovery ventilator.
- Given the high performing building envelope described above, perimeter radiation (heat near the windows) will not be required except at areas with curtainwall glazing.

Plumbing

- The building will be served by a municipal water and sewer system.
- Implement low flow fixtures and waterless urinals to minimize wastewater treatment needs.

Electrical System

- The service requirement for a conventional project this size is 480V, three-phase, 3,000amp.
- An emergency generator with capacity for approximately 25% of full load is also required.

Green Building Standards: Mitigating the Impact of New Construction on the Environment

The 20 Imperatives of the Living Building Challenge[SM]

The Living Building Challenge is a philosophy, advocacy tool, and certification program that addresses development at all scales.

SITE: RESTORING A HEALTHY COEXISTENCE WITH NATURE

- **01 Limits to Growth**
  Eligible sites include greyfields or brownfields that are not on or adjacent to sensitive ecological habitats, prime farmland, or within the 100-year flood plain. Landscape may only be native and/or naturalized species planted to support succession.
- **02 Urban Agriculture**
  All projects must integrate opportunities for agriculture appropriate to the scale and density of the project using its floor area ratio as the basis for calculation.
- **03 Habitat Exchange**
  For each hectare of development, an equal amount of land must be set-aside for thriving ecosystems.
- **04 Car Free Living**
  Each new project should contribute towards the creation of walkable, pedestrian-oriented communities.

WATER: CREATING WATER INDEPENDENT SITES, BUILDINGS AND COMMUNITIES

- **05 Net Zero Water**
  One hundred percent of occupants' water use must come from captured precipitation or closed loop water systems that are appropriately purified without the use of chemicals.
- **06 Ecological Water Flow**
  One hundred percent of storm water and building water discharge must be managed on-site and integrated into a comprehensive system to feed the project's demands.

- Electrical systems should be selected for maximum energy efficiency. T5HO and LED lamping, occupancy sensors, and daylighting controls are recommended. Our design includes light shelves to help daylight reach further into the building.
- This project offers opportunities for the use of photovoltaic (PV) solar energy systems. In this case, PV screens in the parking lot or site mounted solar trackers are suggested. Other than the panel mounting locations, the PV system described in section D of the MEP report (Chapter 13) is applicable to this option.

Data and Telecommunications

- A VOIP (Voice Over Internet Protocol) telecommunications system is recommended to accommodate current telecommuting and future growth. VOIP phones can be plugged in anywhere on the Internet and maintain the same telephone number; an employee working at home could be paged just as easily as if they were at their desk in the office.
- An MDF room in the basement will distribute via multiple 4″conduit risers to three IDF rooms on each floor with ladder-type cable tray distribution from each IDF room to all work areas.

Fire Suppression

The building will have full sprinkler protection.

Site Considerations

- The construction of the building will likely trigger improvements to the intersection of Green Mountain Drive and Memorial Drive, with addition of a traffic signal and turning lanes.
- Constructed wetlands on the site are recommended for stormwater management.
- See Civil Report for additional detail

Renewable Energy and Green Building

The orientation of the site, with good solar access and protection from cold northwest winds, offers opportunities for sustainable building. Attempting a "Net Zero Building" (which requires all energy to be produced on-site), would also help mitigate project impacts. At a minimum, with energy costs anticipated to continue to rise, the application of an energy model based on the LEED-NC requirements for applying ASHRAE standard 90.1 energy modeling should be employed, targeting an energy use reduction of at least 25% when compared to a baseline model. The site also offers the opportunity to meet the Living Building Challenge (see sidebar).

LIVING BUILDING CHALLENGE℠ (CONTINUED)

ENERGY: RELYING ONLY ON CURRENT SOLAR INCOME

- **07 Net Zero Energy**
  One hundred percent of the project's energy demand must be supplied by on-site renewable energy on a net annual basis.

HEALTH: MAXIMIZING PHYSICAL AND PSYCHOLOGICAL HEALTH AND WELL BEING

- **08 Civilized Environment**
  Every occupiable space must have operable windows that provide access to fresh air, views, and daylight.
- **09 Healthy Air**
  The project must take precautionary measures to maintain a nourishing indoor environment.
- **10 Biophilia**
  The project must be designed to include elements that nurture the innate human attraction to natural systems and processes.

  Materials: Endorsing products and processes that are safe for all species through time
- **11 Red List**
  The project cannot contain any of the listed worst-in-class materials or chemicals that are ubiquitous in the building industry.
- **12 Embodied Carbon Footprint**
  The project must account for the total footprint of embodied carbon from its construction and projected replacement parts through a one-time carbon offset
- **13 Responsible Industry**
  The project must advocate for the creation and adoption of third-party certified standards for sustainable resource extraction and fair labor practices.
- **14 Appropriate Sourcing**
  The project must incorporate place-based solutions and contribute to the expansion of a regional economy rooted in sustainable practices, products and services.

What happens in Waterbury?

This option is an alternative to a full or partial return to the former Waterbury State Office Complex. Construction of this new facility will require expenditures on the Waterbury site to prepare it for sale, to demolish buildings deemed unsalable, and to protect buildings from damage by nature or vandalism until sold. Historic buildings that are demolished may require mitigation measures to offset their loss. Also, insurance will need to be maintained at the site and payments in lieu of taxes made until ownership transfers occur.

Any historic buildings on the site that are leased, sold or transferred out of State ownership will need to have historic preservation covenants placed on them to ensure their long-term preservation. This will require new occupants/owners to consult with the Division for Historic Preservation before undertaking major work on these buildings upon purchase and for the foreseeable future.

LIVING BUILDING CHALLENGE℠ (CONTINUED)

- **15 Conservation + Reuse**
  All projects teams must strive to reduce or eliminate the production of waste during design, construction, operation, and end of life in order to conserve natural resources.

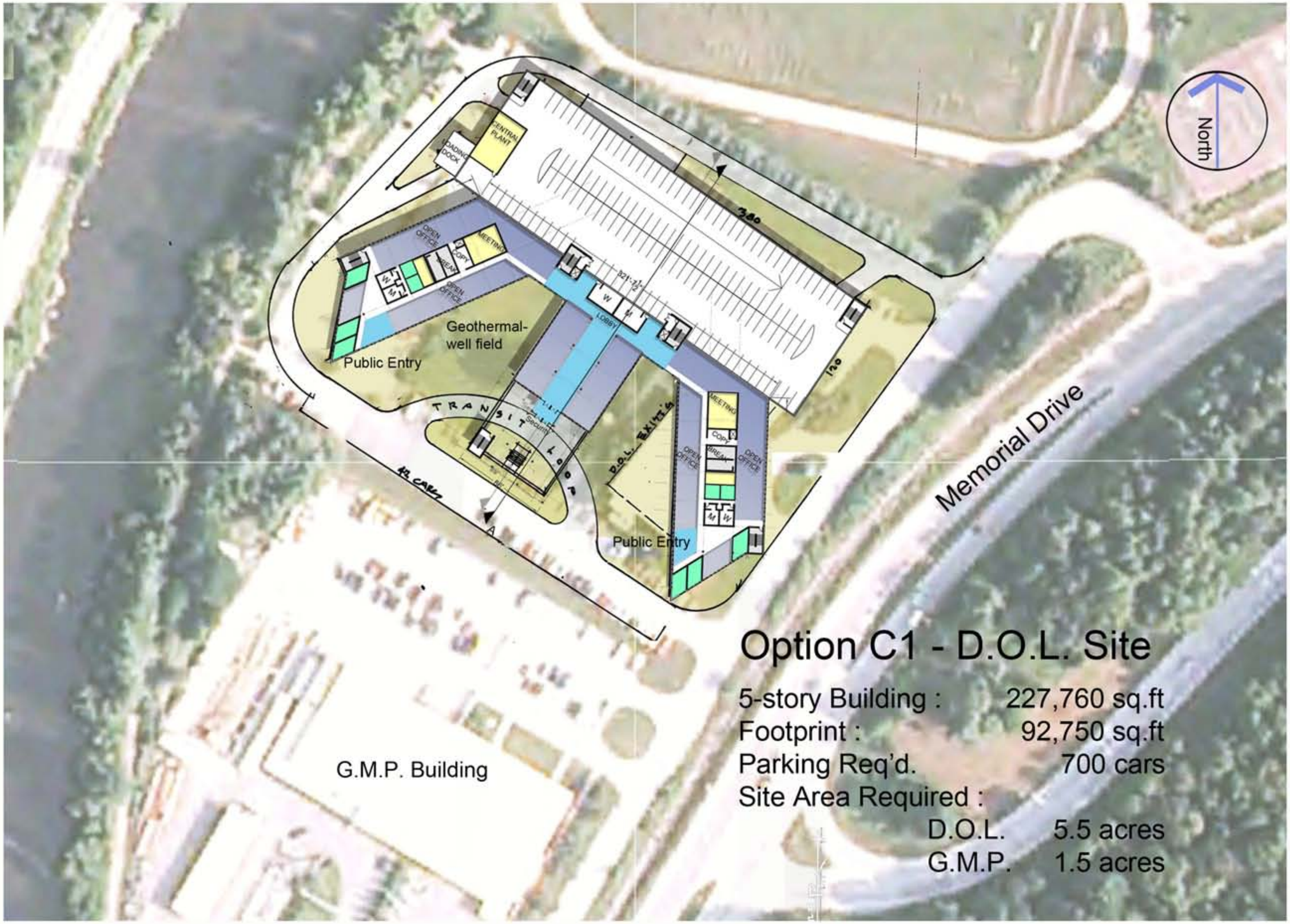
EQUITY: SUPPORTING A JUST, EQUITABLE WORLD

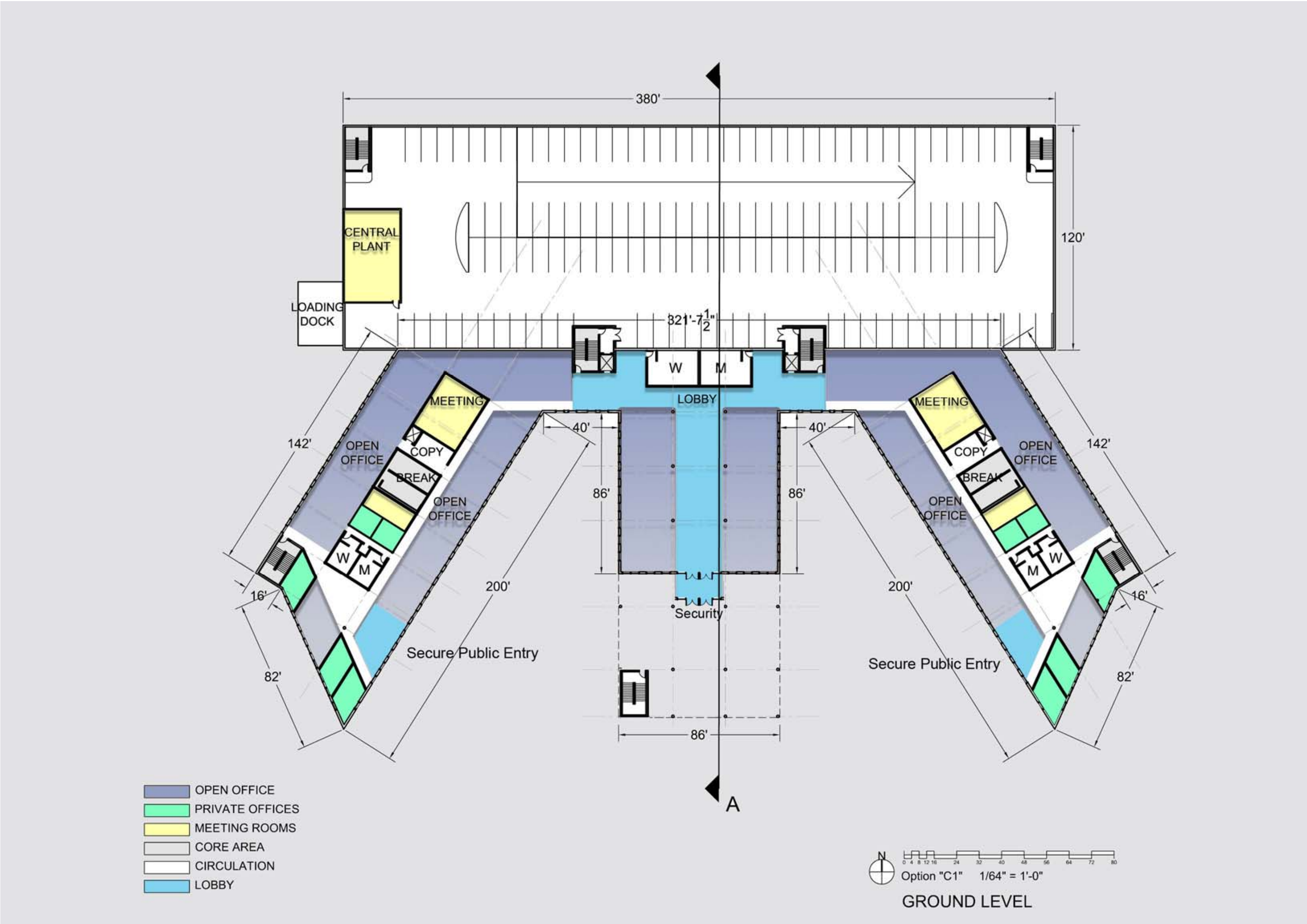
- **16 Human Scale + Humane Places**
  The project must be designed to create human-scaled rather than automobile-scaled places, so that the experience brings out the best in humanity and promotes culture and interaction.
- **17 Democracy + Social Justice**
  Reasonable steps must be taken to ensure that all people, regardless of background, age and socioeconomic class, can benefit from the externally focused infrastructure created by the project.
- **18 Rights to Nature**
  The project may not block access to, nor diminish the quality of, fresh air, sunlight and natural waterways for any member of society or adjacent developments.

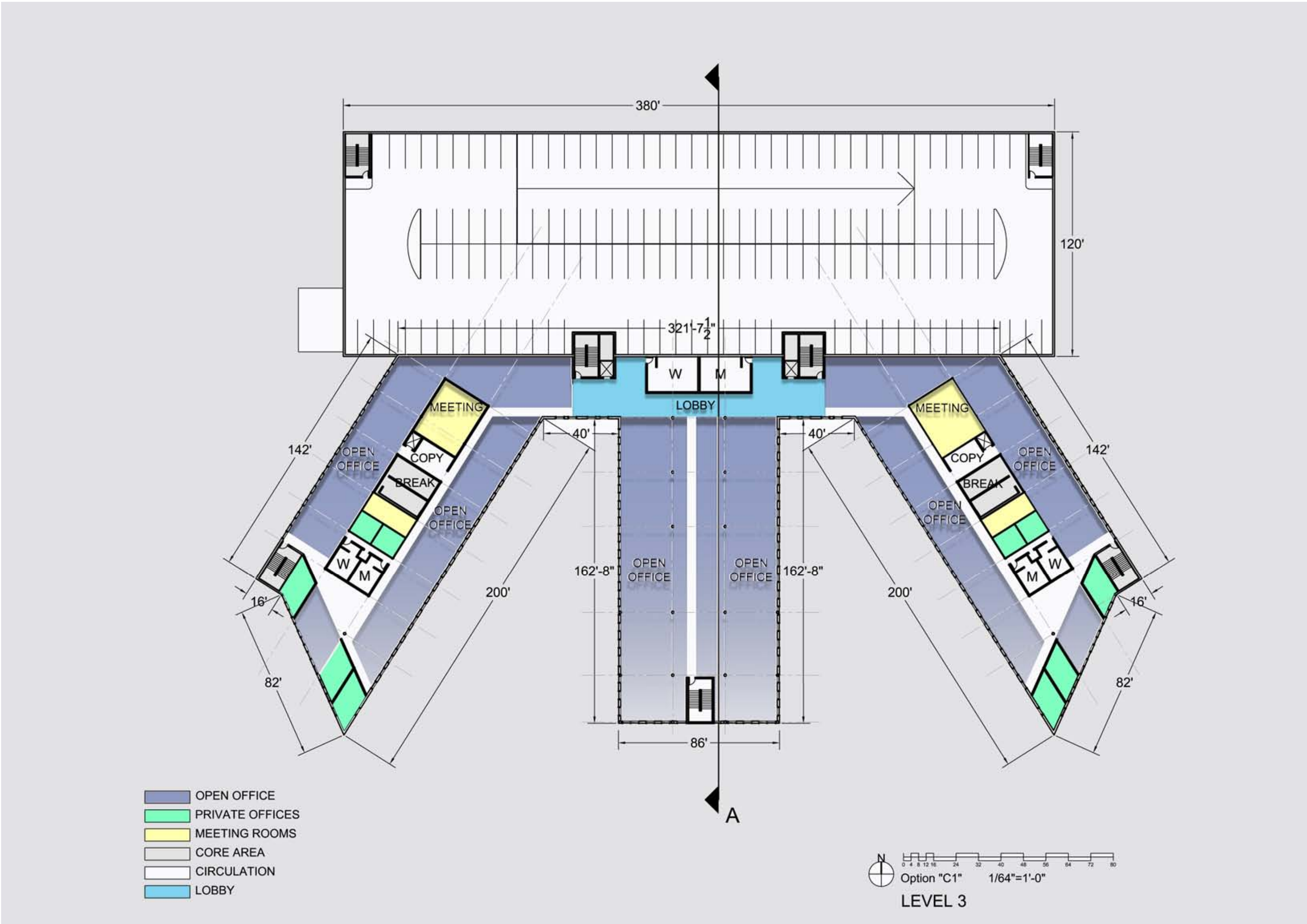
BEAUTY: CELEBRATING DESIGN THAT CREATES TRANSFORMATIVE CHANGE

- **19 Beauty and Spirit**
  The project must contain design features intended solely for human delight and the celebration of culture, spirit and place appropriate to its function.
- **20 Inspiration and Education**
  Educational materials about the performance and operation of the project must be made public to share successful solutions and to motivate others to make change.

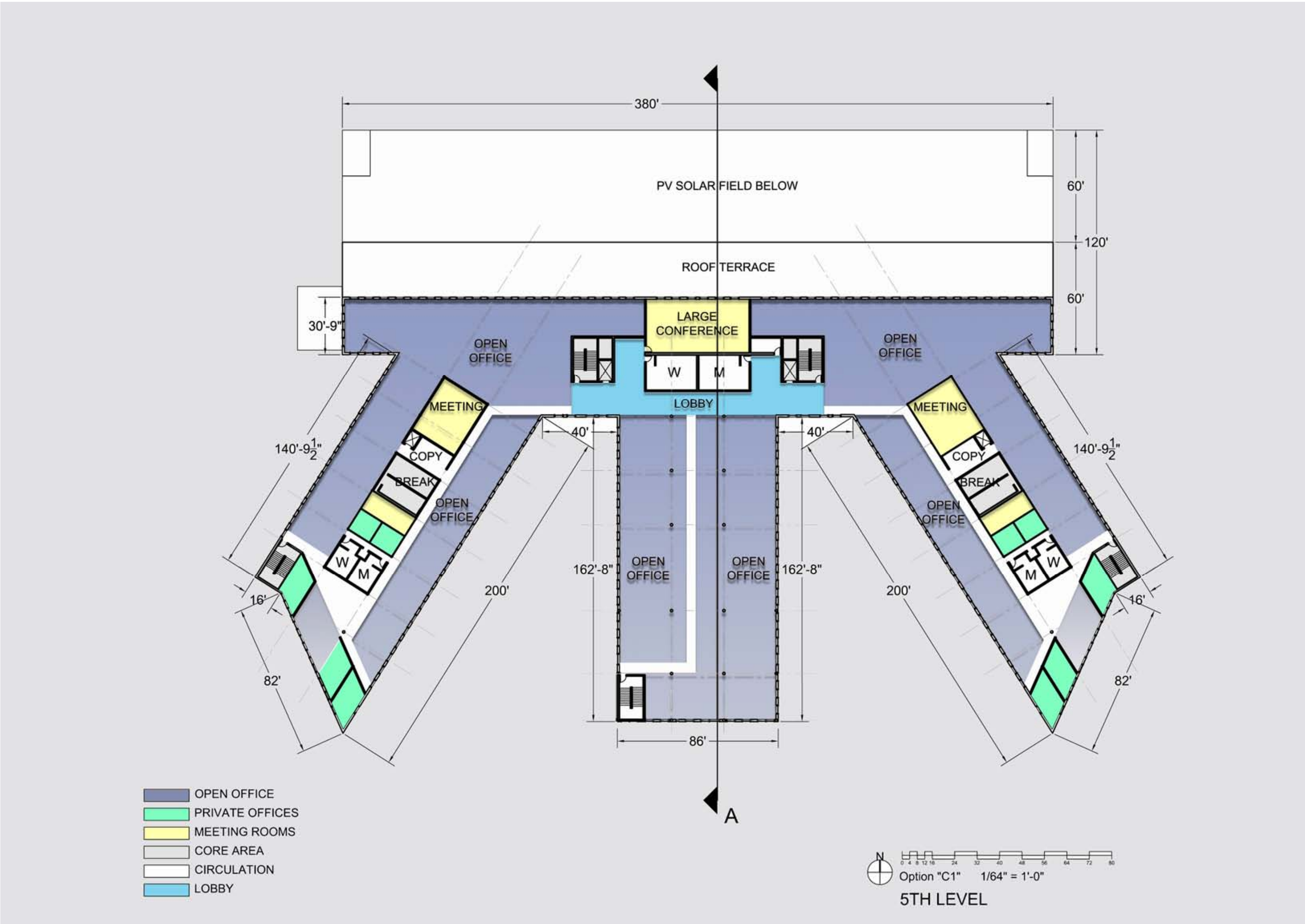

Winooski River
292 cars -
GMP site
Transit
Loop
Geo-thermal
wells
5- story New Facility
Parking structure green roof
Roof-top
P.V. panels
G.M.
Building
Montpelier High School
running track
North
Green Mountain Drive
R.R. Spur
Memorial Drive
NTL. Life Drive

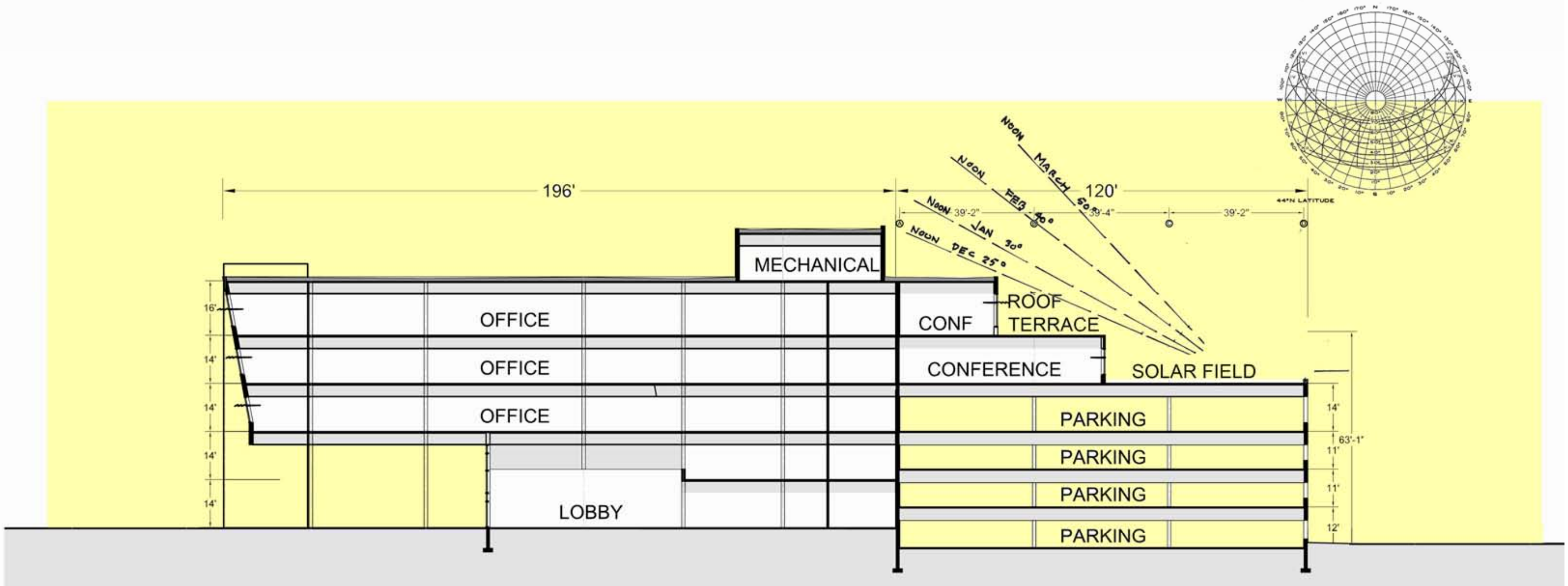

North
CENTRAL PLANT
LOADING DOCK
OPEN OFFICE
MEETING
COPY
BREAK
LOBBY
Geothermal-
well field
Public Entry
TRANSIT LOOP
Security
D.O.L. EXIT'S
Public Entry
Memorial Drive
G.M.P. Building
Option C1 - D.O.L. Site
5-story Building : 227,760 sq.ft
Footprint : 92,750 sq.ft
Parking Req'd. 700 cars
Site Area Required :
D.O.L. 5.5 acres
G.M.P. 1.5 acres


380'
120'
CENTRAL PLANT
LOADING DOCK
321'-7 1/2"
W
M
LOBBY
MEETING
COPY
BREAK
OPEN OFFICE
OPEN OFFICE
40'
40'
86'
86'
142'
142'
16'
16'
82'
82'
200'
200'
Security
Secure Public Entry
Secure Public Entry
86'
A
OPEN OFFICE
PRIVATE OFFICES
MEETING ROOMS
CORE AREA
CIRCULATION
LOBBY
N
Option "C1" 1/64" = 1'-0"
GROUND LEVEL



380'
120'
321'-7 1/2"
W
M
LOBBY
MEETING
COPY
BREAK
OPEN OFFICE
40'
142'
162'-8"
200'
16'
82'
86'
A
OPEN OFFICE
PRIVATE OFFICES
MEETING ROOMS
CORE AREA
CIRCULATION
LOBBY
N
Option "C1"
1/64"=1'-0"
LEVEL 3


380'
PV SOLAR FIELD BELOW
ROOF TERRACE
60'
120'
60'
30'-9"
LARGE CONFERENCE
OPEN OFFICE
OPEN OFFICE
W
M
LOBBY
MEETING
MEETING
COPY
COPY
BREAK
BREAK
OPEN OFFICE
OPEN OFFICE
40'
40'
140'-9½"
140'-9½"
W
M
W
M
162'-8"
OPEN OFFICE
OPEN OFFICE
162'-8"
200'
200'
16'
16'
82'
82'
86'
A
OPEN OFFICE
PRIVATE OFFICES
MEETING ROOMS
CORE AREA
CIRCULATION
LOBBY
N
Option "C1" 1/64" = 1'-0"
5TH LEVEL



N Option C1- Section 1/32'

Part 2, Options

*Chapter 5: Option C2-
Hypothetical Site w/o
Municipal Water or Sewer*

Summary Option C2

HYPOTHETICAL SITE WITHOUT MUNICIPAL WATER OR SEWER

Overview

If the State decides against redevelopment of the Waterbury site, as described in options A and B, a new building to consolidate the Agency of Human Services (AHS) facility on a previously undeveloped site would provide enough office additional office space to house all displaced workers from Waterbury; this option has capacity for 1,024 employees.

We designed this option for an imagined building site which is:

- Not in a floodplain
- Not in an existing town or city center
- Not previously developed

Taken together, these site selection criteria eliminate many of Vermont's city, town, and village centers, which are often located in river valleys due to historical settlement patterns.

A suburban "greenfield" (previously undeveloped) site offers a possible alternative, with its own set of advantages and disadvantages.

Advantages

- A site out of the floodplain can be selected and flood mitigation costs avoided.
- Potentially lower insurance costs

Disadvantages

- Land acquisition would be required as we've been told that no existing State properties are large enough to accommodate a project of this size; land acquisition is included in the Option C2 cost estimate. Regulations for soil mitigation set-asides require a very large site.
- Building away from existing cores increases automobile dependence; roadway improvements and traffic signals will be needed.
- An extensive Act 250 permitting process will be required.
- The project would likely need to provide its own water and wastewater disposal.
  - > Conventional methods including wells and septic may not be feasible on many Central Vermont sites
  - > Rainwater collection, purification, and storage may be viable; a living machine for wastewater processing may also be viable.
  - > Either method will require a licensed operator and substantial ongoing costs.
  - > Firefighting water storage and pumps also would be required.

Construction cost: $78,574,343
Project cost: $108,043,465
Area: 199,680 SF
Project cost per sq ft: $394
Operating cost: $1,805,000
Insurance: $13 to $25 million
Land area/lot size: 30 to 40 acres
Permitting process: medium to high Intensity
In floodplain? No
Parking: 768 cars, open site
Design standard: LEED Gold, institutional high quality
Staff capacity: 1,024

- Adequate power and data infrastructure may not be present at some possible sites.
- "Mothballing" of Waterbury site incurs expenses and potential liabilities.

Zoning Considerations

We reviewed zoning ordinances in several towns within 30 miles of Montpelier that could potentially offer a site for the proposed building. Note that this option is a design exercise only and the town zoning ordinances compared in order to establish parameters for the project don't necessarily reflect potential sites.

Use: Commercial Office

- Maximum Height—45´
- Maximum lot coverage—75% for buildings and improvements
- Parking—19´x 20´ space for each 200 Net Square Feet of building area

Building Construction Summary

The size of this building was calculated as follows:

AGENCY	FTEs	NET SQ FT @ 150NSF/PERSON	GROSS SQ FT @30% NET-TO-GROSS FACTOR
Agency of Human Services	1,024	153,600	199,680

Using the typical standard of 13´-6˝–14´-0˝ floor-to-floor heights to allow for flexible installation of building systems for a "long life, loose fit" office structure, we established that the building will be limited to three stories to fit the 45´ maximum height stipulated by zoning. A mechanical penthouse is recommended but would require a height variance in most Central Vermont communities. A three story building of 199,680 GSF and 153,600 NSF is achieved with three floor plates of ~71,900GSF and a "walk out" basement level with a cafeteria and boiler plant that adds an additional 25,975GSF. Depending on height calculation methods stipulated by zoning, a walkout basement might also require a variance.

The floorplate size and shape was determined by striking a balance between a floorplate that is "shallow" enough to allow daylight to penetrate but is not extended to the point where the building has an excessively large perimeter dimension. In our climate, minimizing the perimeter and surface areas of a building is important to reduce heat gain and loss through the building envelope; finding the right balance between adequate area for windows and minimal perimeter will maximize energy efficiency and we strongly encourage an energy model be applied to various scenarios.

Based on interviews with the Department of Buildings and General Services, we are assuming that the building will be occupied and used by state government for at least 50 years, and likely much longer. We therefore recommend

Representative Zoning Requirements for Commercial Office Space in Vermont

MAXIMUM HEIGHT— 45' (INCLUDING PITCHED ROOFS AND PENTHOUSES)

Berlin: 45' absolute (incl roof, PH); **Barre Town**: 40' to any flat roof or 40' to midpoint of gable; **Waterbury Town:** 5' absolute; **Williston:** 36', PH not included

MAXIMUM LOT COVERAGE—75% FOR BUILDINGS AND IMPROVEMENTS

Berlin: 75%; **Barre Town:** 75%; **Williston:** max coverage established by required setbacks and parking buffers; **Waterbury:** 25% (Our overview of Waterbury zoning showed a maximum for building coverage only; additional coverage appears permissible for "improvements," which would include parking and roadways.)

PARKING—1 9'x20' SPACE FOR EACH 200 NET SQUARE FEET OF BUILDING AREA

- Our design assumes a parking management plan; the composite of the zoning regulations we studied was 1 space per 188 net square feet. Towns have differing bases for parking requirements, and we applied conversion factors to achieve an average requirement based on net square footage.
- **Berlin:** 1 per 200nsf; **Barre Town:** 1 per 200gsf, 10'x20' spaces; **Waterbury:** 1 per 300gsf, 9x18'spaces; **Williston:** 1 per 285gsf (expressed as 3.5 per 1,000gsf, plus bike parking)
- For reference, the existing National Life Property has 690 surface and 663 garage spaces, yielding 1,353 total spaces serving 518,000GSF or 1 space per 383 GSF gross. National Life has a parking management plan, carpooling spots, shuttles, and transit access.

construction types, building configurations, and energy conservation measures that will make the structure viable for the foreseeable future. LEED Gold should be the minimum target for sustainable design, with an energy use reduction of at least 25% over baseline. LEED Platinum and design to a Net Zero standard is possible and recommended. See sidebars for information on LEED and Net Zero. While it is possible to use LEED as a design guideline and not certify, the rigor of the certification process helps ensure targets are met and provides valuable information to the design team and to the building operators.

Construction Type

For this new structure, we would assume type 2B construction. This can best be described as “unprotected, noncombustible” construction and is generally achieved with a steel framed building. In this case, we envision a cast-in-place concrete foundation, a partial walkout basement in addition to the three above grade floors, and a steel frame beginning at the first level at or above grade. Conventional, wide flange steel columns and beams would support all floors, and the roof would likely be constructed from open-web steel trusses. Given adequate access to the building perimeter, the code would not require fire protection on the steel, allowing for the freestanding interior columns to be exposed, painted steel. Note that the absolute maximum floor area allowable with increases for sprinkler protection and frontage (fire apparatus access) is 86,250 feet per floor with construction type 2B and that extensive frontage is necessary to achieve this value; there may be site configurations that would require a more stringent construction classification for our 71,900sf footprint.

Building Envelope

- Light-gauge metal-framed exterior walls with at least R-20 of continuous insulation placed entirely outboard of the framing and sheathing. Note that with all insulation outboard of the framing, this is roughly equivalent to R-50 insulation placed between metal studs in effective R-value; by stopping thermal conductance through the framing, this will likely function as well as or better than comparable R-50 insulation.
- Continuous roof insulation at R-50 or higher.
- R-15 or higher insulation at sub-grade walls and floors.
- Windows shall be limited to 40% of the wall surface area and shall be triple pane insulated units with argon fill. Glazing should be limited to the area between 30” above the finish floor and the height of the finished ceiling. Glazing U-values below 0.2 and assembly U values below 0.25 are recommended.
- Window coatings and performance should be “tuned” to the solar orientation, to take advantage of passive solar heating on the south elevation in wintertime while avoiding solar gain on eastern and western exposures in the summertime.
- Light shelves at the interior of the windows are recommended in order to bring natural light deeper into the building.

- Air tightness plays a very large role in energy efficiency in our variable climate. A continuous air/ vapor barrier at the exterior portion of the envelope should be specified with careful detailing at windows, doors, changes in plane, and expansion joints. With all of the insulation outboard of structural elements, a vapor barrier at the interior side of the framing is not necessary.

BUILDING SYSTEMS

HVAC

- The proposed physical plant will consist of a woodchip fired boilers. For a new, tightly constructed building of this size, we'd estimate that (1) 400 BHP biomass boilers will be required, with one backup 400 BHP oil-fired boiler, one 600 ton electric centrifugal chiller, and one cooling tower located on the site.
- Woodchip bunkers to be integrated into the building foundation.
- The boilers would produce hot and chilled water circulated to a VAV system by variable AFD pumps.
- The boiler plant is located in the walk-out basement level in the schematic plans and should have a lower floor level than other portions of the basement, to allow 15 feet or more clear to building structure.
- A large overhead door or access areaway should be included to allow replacement equipment, such as a new boiler, to be installed and existing equipment to be removed.
- A rooftop penthouse is proposed to house an energy recovery ventilator.
- Given the high performing building envelope described above, perimeter radiation (heat near the windows) will not be required.

Plumbing—Supply

- The building will either be served by a municipal water system or require wells and a water treatment system. Based on analysis of sites that can accommodate a building this size, our pricing assumes well service. Water supplies may be problematic in some areas of Central Vermont and are described further in the "Site Infrastructure" section below.
- Implement low-flow fixtures and waterless urinals to minimize wastewater treatment needs.

Plumbing—Wastewater

The pricing includes a septic system, as most potential sites are in areas without municipal wastewater systems. See Site narrative for further detail.

Electrical System

The service requirement for a conventional project this size is 480V, 3 phase, 4,000amp. The requirements are larger than the smaller C1 option because of pumps required for wells, the septic system, and the fire suppression system.

- An emergency generator with capacity for approximately 25% of full load is also required.
- Electrical systems should be selected for maximum energy efficiency. T5HO and LED lamping, occupancy sensors, and day lighting controls are recommended. Our design includes light shelves to help daylight reach further into the building.
- This project offers opportunities for the use of photovoltaic (PV) solar energy systems. In this case, PV screens in the parking lot or site mounted solar trackers are suggested. Other than the panel mounting locations, the PV system described in section D of the MEP report (Chapter 13) is applicable to this option.

Data and Telecommunications

- The existence of adequate telecommunications infrastructure will be an important factor in site selection.
- A VOIP (Voice Over Internet Protocol) telecommunications system is recommended to accommodate current telecommuting and future growth. VOIP phones can be plugged in anywhere on the internet and maintain the same telephone number; an employee working at home could be paged just as easily as if they were at their desk in the office.
- An MDF room in the basement will distribute via multiple 4″ conduit risers to 3 IDF rooms on each floor with ladder-type cable tray distribution from each IDF room to all work areas.

Fire Suppression

- The building will have full sprinkler protection. Because gravity pressurized municipal water is not likely to be available, a storage area holding 60,000 gallons will be required. Pumps to distribute this water to the building must be provided and powered by a system with generator backup.
- We propose using the stormwater treatment pond as the most cost effective water storage option. This will require maintenance of fire suppression intakes, and a system to ensure the minimum 60,000 gallons of liquid water is always available- including during wintertime when some of the water could freeze or during dry periods when the pond level might need to be replenished from the wells.

PARKING, ROADWAYS, AND SITE INFRASTRUCTURE

Parking and Roadways

- Surface parking will require a large amount of area: 854 parking spaces are required at 1 space per 200NSF; this is included in our pricing.
- Meeting the State's standard of a space for 85% of Full Time Equivalent employees (FTEs), would require ,1006 spaces.
- As shown in the illustration, the surface parking and roadways cover 327,000 sq ft, or 7.5 acres.
- In comparison, the National Life building has a total of 1,353 parking spaces (690 surface and 663 garage) serving approximately 364,000 NSF, or about 1 space per 270 NSF, with a parking management plan that includes transit access and carpooling incentives.
- The proposed population of this building, at 1,138, is more than that of many Vermont towns and upgrades to roadway infrastructure, such as added turn lanes and traffic signals, should be factored into the project cost.
- Alternate for Parking Structure
  > This options base scope is for surface parking in order to contrast with Option C1. The impacts of this quantity of surface parking could be mitigated by a parking structure. The proposed structure would hold 647 cars and reduce the impervious surface area of the site from7.5 acres to 4.5 acres.
  > This would result in a decrease in size of the stormwater retention pond from 1.2 acres to .8 acres and reduce total lot size from 40 acres to 30 acres.

Stormwater Management

- Adding the building footprint of about 1¾ acres and considerations for walkways to the parking area yields impervious coverage of approximately 8 acres.
- Stormwater management for the impervious surfaces on the site will create a challenge, and treatment ponds will need to cover approximately 1 acre.
- Bioswales (planted areas between rows of parking and/or at the perimeter of paved areas) could help with stormwater treatment and reduce the size of the retention pond.

Water Supply & Treatment

- Our water and wastewater assumptions are based on the 1,138 building occupants and 250 visitors per day.
- 5-6 artesian wells would be required to support a facility this size. A full treatment system would be required and many Central Vermont sites have groundwater compromised by arsenic and heavy metals from natural and human sources.

- An alternative to wells would be to design the roof to capture rainwater for purification. Lower pumping costs may also work in favor of this option, however, there may be permitting challenges.
- Wastewater treatment will require a large septic field and a four-chamber sand pre-filter or other packaged pretreatment system.
- A septic system of this size must have a redundant septic field, so two equal fields totaling between 4.25 and 14 acres will be required; the size will depend on soil conditions at the selected site.
- Due to size, both the water supply and wastewater systems will need to be licensed systems with a qualified operator. Federal and state water and wastewater system reporting will be required.

Soils Mitigation

Development of greenfield sites requires set-aside lands to offset the loss of naturally functioning soils. The set-aside lands, which must be preserved from development but may be farmed, will be between 2 and 3 times the impervious surface on the project site, with some additional mitigation for other disturbed soils (such as the septic field). We estimate a set-aside factor for this site of 2.5, resulting in a total site area of approximately 75 acres (with surface parking) or 45 acres (with parking structure).

Site Cost deduct for Town Water & Sewer Access

Option C2 has assumed a new Greenfield site with no access to Town water & sewer. This results in a very high cost to build "on-site" utilities to accommodate over 1,000 building occupants. The site costs identified in the C2 estimate have approximately a $6,000,000 premium to provide a 5 acre septic field, dosing tanks, wet well, valve pits, control building, along with 9,000 lineal feet of disposal field trench, on site water components including 2 to 6 wells, process water equipment, and fire storage.

Once sites are identified the engineering process can start to evaluate what capacities a town may have to accommodate 200,000 GSF of new building, distance to get utilities to the selected site, and the cost of construction for these elements. Currently there are many variables that are affecting a conservative approach to estimating Option C2. Soil capacity and quality alone could double the amount of area required for an on- site septic solution.

A $5,000,000 deduct to the C2 estimate may be assumed if Town water & sewer is supplied and we recommend carrying $1,000,000 to help get town utilities to the site.

Renewable Energy and Green Building

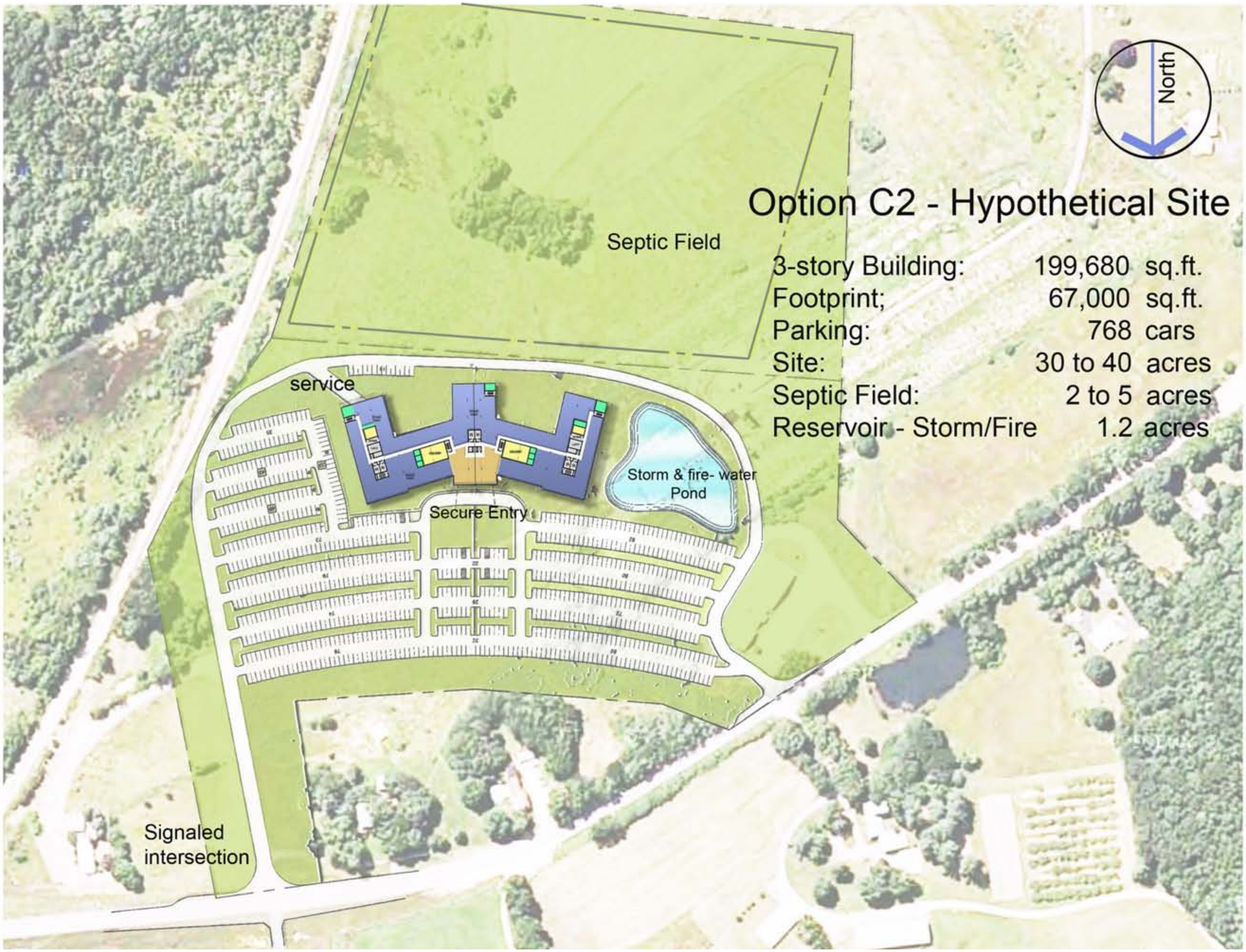
At this site in particular, extensive use of renewable energy systems is recommended to offset the environmental impacts of developing a "greenfield" site. Attempting a "Net Zero Building" (which requires all energy to be produced on-site), would also help mitigate project impacts. At a minimum, with energy costs anticipated to continue to rise, the application of an energy model based on the LEED-NC requirements for applying ASHRAE standard 90.1 energy modeling should be employed, targeting an energy use reduction of at least 25% when compared to a baseline model.

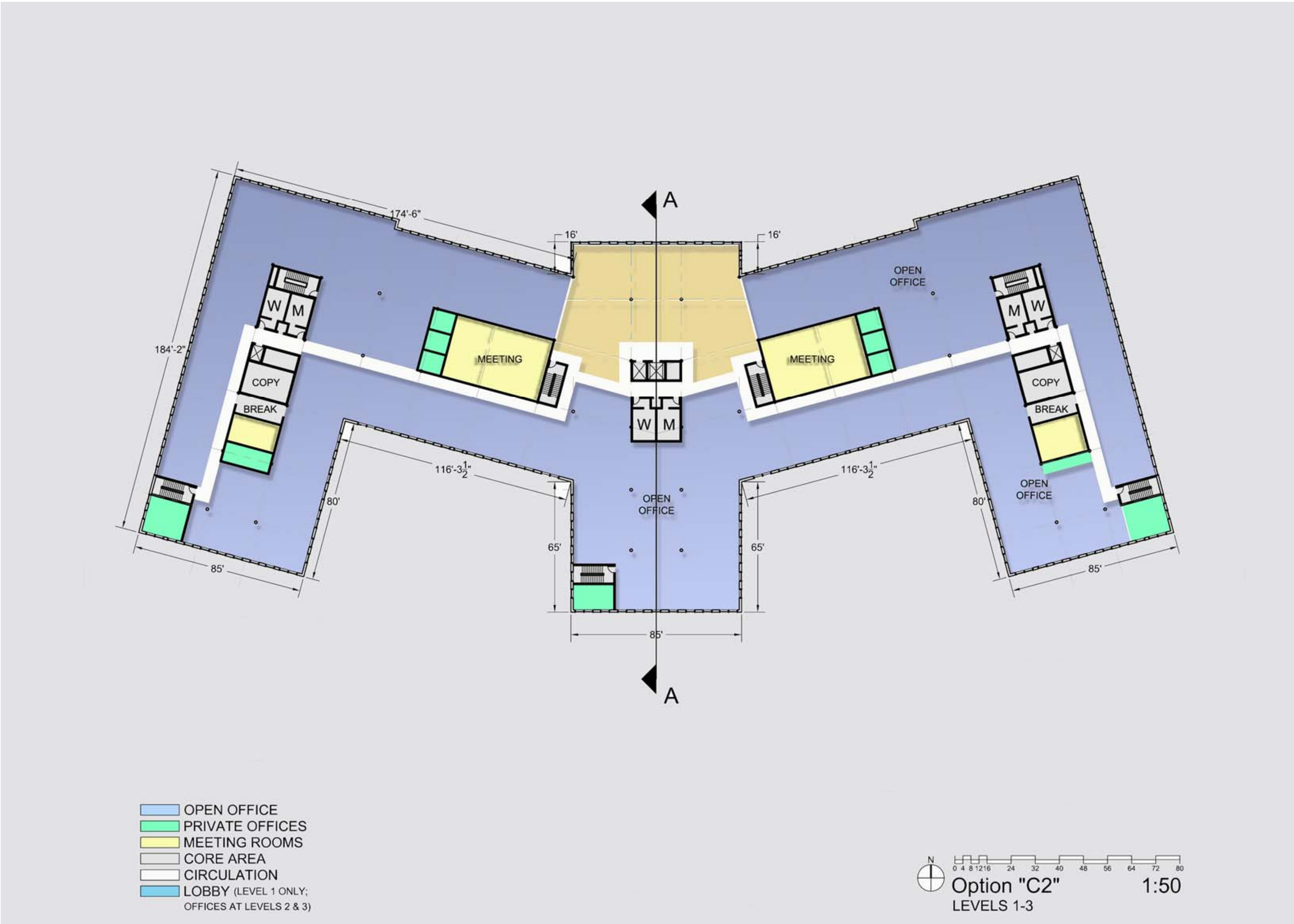
What happens in Waterbury?

This option is an alternative to a full or partial return to the former Waterbury State Office Complex. Construction of this new facility will require expenditures on the Waterbury site to prepare it for sale, to demolish buildings deemed unsalable, and to protect buildings from damage by nature or vandalism until sold. Historic buildings that are demolished may require mitigation measures to offset their loss. Also, insurance will need to be maintained at the site and payments in lieu of taxes made until ownership transfers occur.

Any historic buildings on the site that are leased, sold or transferred out of State ownership will need to have historic preservation covenants placed on them to ensure their long-term preservation. This will require new occupants/owners to consult with the Division for Historic Preservation before undertaking major work on these buildings upon purchase and for the foreseeable future.


Signaled Intersection
768 Car Surface Lot
Storm Water & Fire Water Reservoir
3-Story New Facility
Delivery
Septic Field
North


North
Option C2 - Hypothetical Site
Septic Field
3-story Building: 199,680 sq.ft.
Footprint; 67,000 sq.ft.
Parking: 768 cars
Site: 30 to 40 acres
Septic Field: 2 to 5 acres
Reservoir - Storm/Fire 1.2 acres
service
Storm & fire- water Pond
Secure Entry
Signaled intersection


A
174'-6"
16'
16'
184'-2"
W
M
COPY
BREAK
MEETING
MEETING
OPEN OFFICE
M
W
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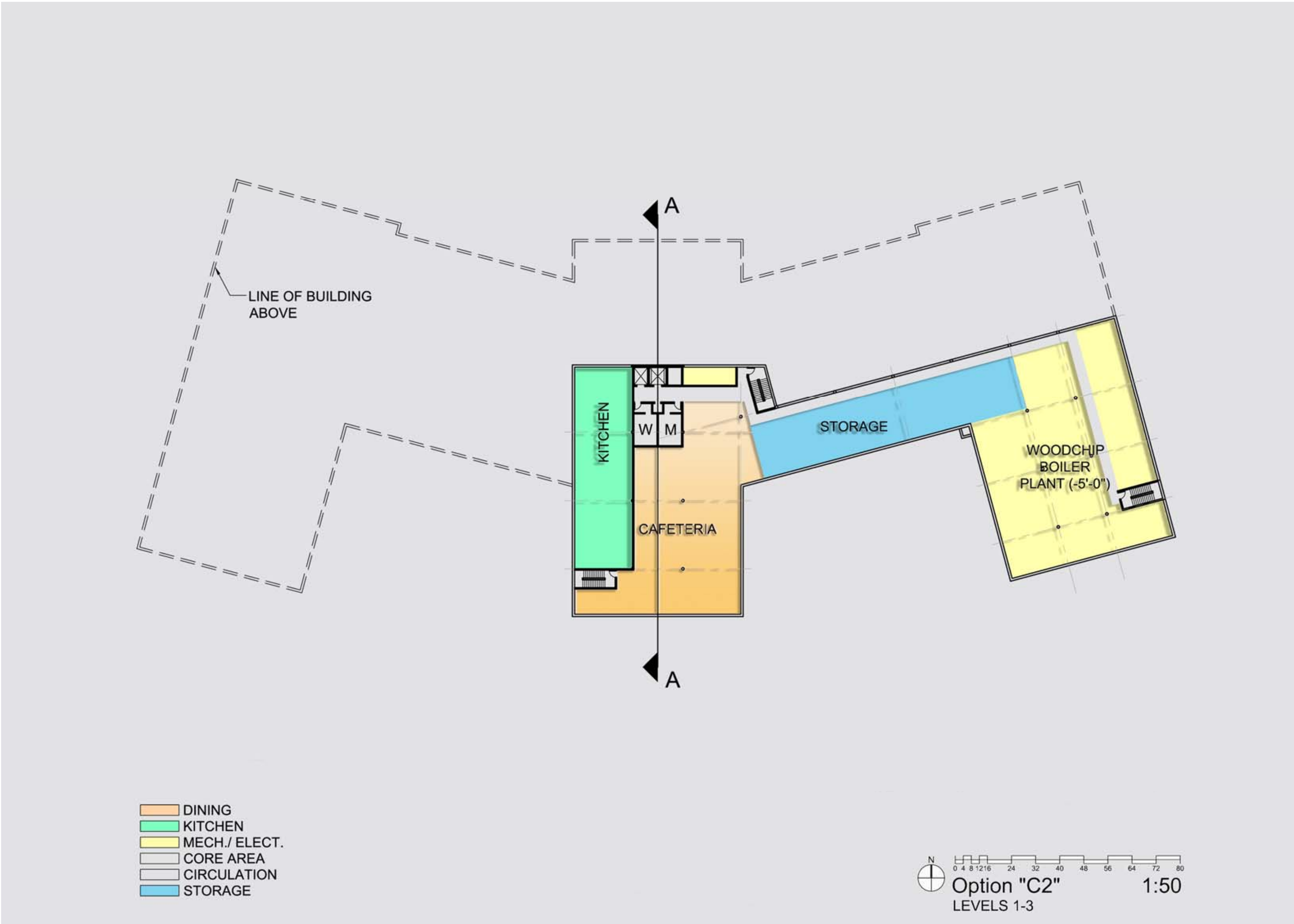
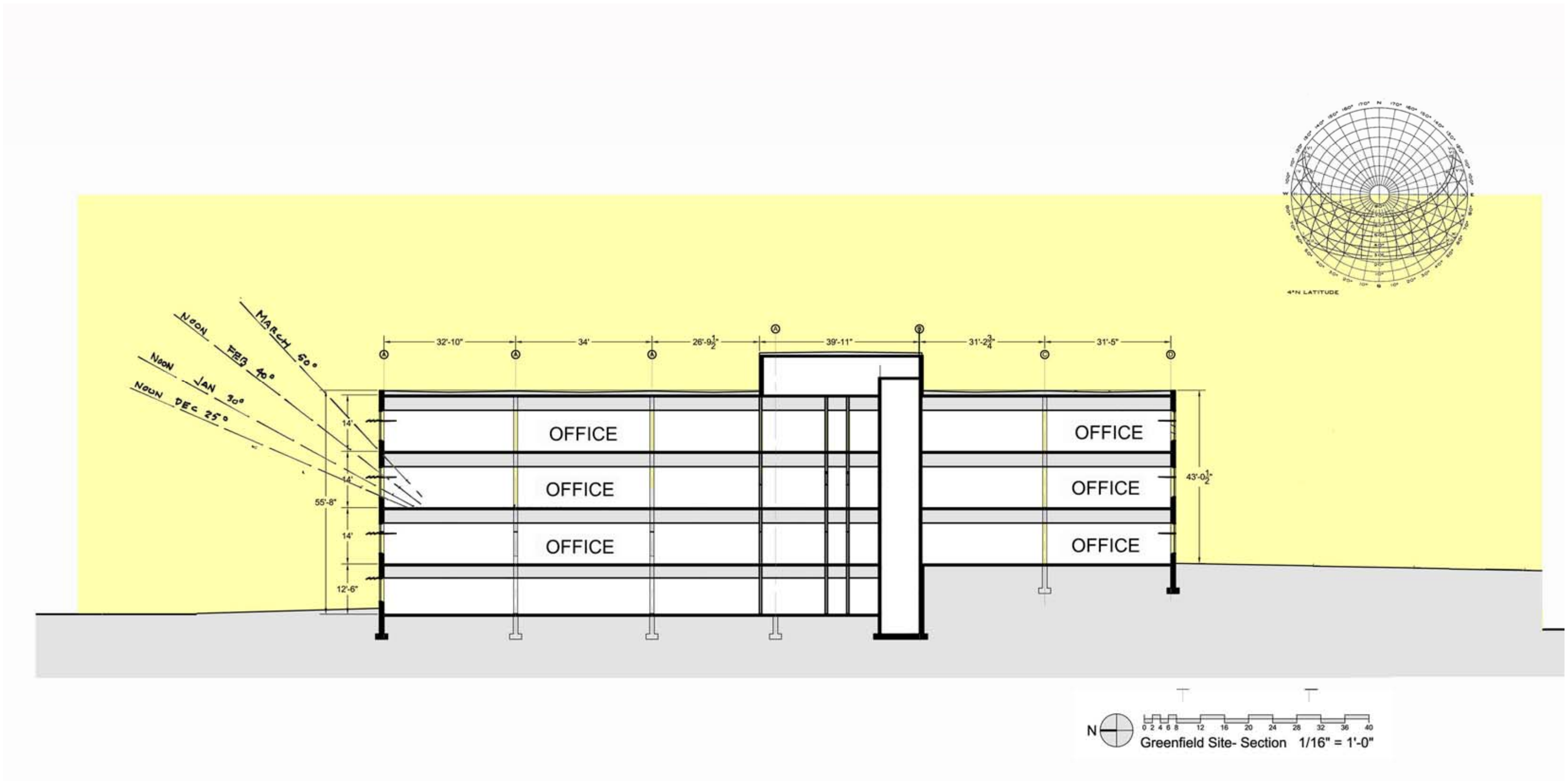
BREAK
W
M
116'-3½"
116'-3½"
80'
80'
OPEN OFFICE
OPEN OFFICE
65'
65'
85'
85'
85'
A
OPEN OFFICE
PRIVATE OFFICES
MEETING ROOMS
CORE AREA
CIRCULATION
LOBBY (LEVEL 1 ONLY; OFFICES AT LEVELS 2 & 3)
N
0 4 8 12 16 24 32 40 48 56 64 72 80
Option "C2"
1:50
LEVELS 1-3


A
LINE OF BUILDING ABOVE
KITCHEN
W
M
CAFETERIA
STORAGE
WOODCHIP BOILER PLANT (-5'-0")
A
DINING
KITCHEN
MECH./ ELECT.
CORE AREA
CIRCULATION
STORAGE
N
0 4 8 12 16 24 32 40 48 56 64 72 80
Option "C2"
1:50
LEVELS 1-3


NOON MARCH 50°
NOON FEB 40°
NOON JAN 30°
NOON DEC 25°
32'-10"
34'
26'-9 1/2"
39'-11"
31'-2 3/4"
31'-5"
14'
14'
55'-8"
14'
12'-6"
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
OFFICE
43'-0 1/2"
N
0 2 4 6 8 12 16 20 24 28 32 36 40
Greenfield Site- Section 1/16" = 1'-0"

Part 2, Options

Chapter 6: Option D- Hybrid

Option D: Hybrid

The Option D Hybrid scheme has not been determined at this time.